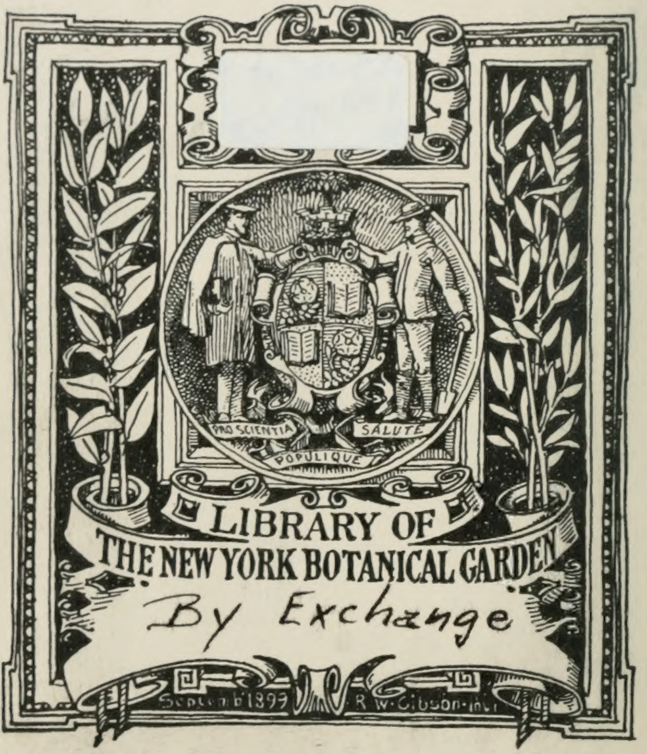

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ANNUAL REPORTS
OF THE
DEPARTMENT OF AGRICULTURE

FOR THE YEAR ENDED JUNE 30,

1912.

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REPORT OF THE
SECRETARY OF AGRICULTURE.

REPORTS OF CHIEFS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1913.

XH
.N7985
1912

[CHAPTER 23, Stat. at L., 1895.]

[AN ACT providing for the public printing and binding and the distribution of public documents.]

* * * * * * *

Section 73, paragraph 2:

The Annual Report of the Secretary of Agriculture shall hereafter be submitted and printed in two parts, as follows: Part One, which shall contain purely business and executive matter which it is necessary for the Secretary to submit to the President and Congress; Part Two, which shall contain such reports from the different bureaus and divisions, and such papers prepared by their special agents, accompanied by suitable illustrations, as shall, in the opinion of the Secretary, be specially suited to interest and instruct the farmers of the country, and to include a general report of the operations of the department for their information. There shall be printed of Part One, one thousand copies for the Senate, two thousand copies for the House, and three thousand copies for the Department of Agriculture; and of Part Two, one hundred and ten thousand copies for the use of the Senate, three hundred and sixty thousand copies for the use of the House of Representatives, and thirty thousand copies for the use of the Department of Agriculture, the illustrations for the same to be executed under the supervision of the Public Printer, in accordance with directions of the Joint Committee on Printing, said illustrations to be subject to the approval of the Secretary of Agriculture; and the title of each of the said parts shall be such as to show that such part is complete in itself.

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REPORT OF THE SECRETARY OF AGRICULTURE.

REPORT

OF THE

SECRETARY OF AGRICULTURE.

Mr. President:

I respectfully present my Sixteenth Annual Report, covering the work of the Department of Agriculture for the year 1912.

BRIEF COMMENTS.

The most effective move toward reduced cost of living is the production of greater crops. This is attributable to the work of the Department of Agriculture, the agricultural colleges and experiment stations, and the help of the press in publishing every movement to help the farmers. Demonstration work in Southern States in the fields has been of immediate benefit. The South has increased the food supply very much in the last few years. The movement ordered by Congress to take farm demonstration into all Northern States will bring more food into our markets. Our fields can and will steadily increase their output in coming years as ways and means of growing heavier crops become better understood. The Nation forgot its farmers in the general scheme of education of past years; few philanthropists thought of them when giving for education. Congress is good to them. They are waking up and thinking for themselves.

The crop of sugar from the beet was 600,000 tons a year ago; it is 700,000 tons this year. The sugar comes from the carbon-dioxide of the atmosphere, taking no valuable plant food from the soil. The process of growing is intensive agriculture, something new to all but our gardeners, and prepares the soil for increased yields of all other crops.

One hundred and sixty-four thousand square miles have been cleared of the fever tick in the Southern States, equal to the area of three States. The farmers there are bringing in improved stock and will soon contribute materially to the meat supply.

Seven hundred acres of Egyptian and other long-staple cotton are being grown on the Colorado River in southern California, under research conditions that give good promise of eventually supplying the demand for such fibers. Thread makers of Europe are here inquiring into future supplies of long-staple cotton. The market waits for the scientist to do his work.

When the Panama Canal is open for business our bulbs and beet seed will come from the Pacific coast.

The leading specialists of the Department of Agriculture educate their assistants. The outside world wants them and pays more than the law permits being paid in the Government service.

The food and drugs act is exacting on department time; 1,459 violations were sent to the Department of Justice during the last year—25 per cent more than in the year before. Jail sentences are now being imposed.

Our farmers get only half crops on the average, or 10 tons of beets from an acre. They are learning how to farm intensively and will grow twice this tonnage in a few years, when they will not fear reduction of duties.

Our dry-land problems will be measurably solved through alfalfas from Siberia and nonsaccharine sorghums from Africa.

Congress has given us law to keep out diseased and insect-infested plants.

Farm demonstration in the fields is being organized in all the Northern States, Congress providing.

The field is the best classroom for instruction in practical agriculture.

Department study of poultry and eggs will help to get these foods to market in good condition.

The sea is the great reservoir of potash. The kelp plant gathers it. We gather the kelp and extract.

Two feet of woven wire and three barb wires keep dogs out of a sheep pasture. Dogs outnumber sheep in many States, and we have not learned to eat dogs as they do in some European countries. The reason given by most farmers why they do not keep sheep is "the dogs." Kansas had, in 1910, 175,000 sheep and 199,000 dogs, Coburn tells us.

The town does not need the retired farmer, while the farm needs his experience and his capital. A retired farmer is capital going to waste.

Taking care of the soil is the first consideration in the conservation of our resources.

Denmark buys our mill feeds and sells $40,000,000 of dairy products to Great Britain.

Bookkeeping will soon be as common on the farm as in the factory. It is just as important for a farmer to know what it has cost to produce a given crop as for the manufacturer to know the cost of making the article he sells.

CROP RESULTS.

MOST PRODUCTIVE OF ALL YEARS.

EARTH'S GREATEST DIVIDEND.

Most productive of all agricultural years in this country has been 1912. The earth has produced its greatest annual dividend. The sun and the rain and the fertility of the soil heeded not the human controversies, but kept on working in cooperation with the farmers' efforts to utilize them. The reward is a high general level of production. The man behind the plow has filled the Nation's larder, crammed the storehouses, and will send liberal supplies to foreign countries.

The prices at the farm are generally profitable, and will continue the prosperity that farmers have enjoyed in recent years. In spite of the lower total value of animals sold and slaughtered, the total crop value is so far above that of 1911, and of any preceding year, that the total production of farm wealth is the highest yet reached by half a billion dollars.

Based on the census items of wealth production on farms, the grand total for 1912 is estimated to be $9,532,000,000. This unthinkable amount of wealth has been contributed to the Nation in one year by the soil and by the farmers' live stock. It is more than twice the value of the wealth produced on farms in 1899, according to the census, and it is about one-eighth more than the wealth produced in 1909.

During the last 16 years the farmer has steadily increased his wealth production year by year, with the exception of 1911, when the value declined from that of the preceding year. If the wealth produced on farms in 1899 be regarded as 100, the wealth produced 16 years ago, or in 1897, is represented by 84, and the wealth produced in 1912 by 202.1. During the 16 years the farmers' wealth production increased 141 per cent.

The array of figures that expresses the farmers' contribution to national wealth production testifies to the farmers' basic importance to the Nation. During the last 16 years the wealth production on farms, according to the census items, reached the grand total of more than $105,000,000,000. This stream of wealth has poured out of the farmers' horn of plenty, and in 16 years has equaled about three-quarters of the present national wealth.

CHIEF CROPS.

In the statement that follows concerning the crop quantities and values for 1912 no figures should be accepted as anticipating the final estimates of this department to be made later. Only approximations can be adopted, such as could be made by any competent person outside of this department. All values are for products at the farm unless otherwise stated, and in no item are values at the produce or commercial exchange.

CORN.

A cornfield half as large again as Italy, or nearly as large as either France or Germany, is the area of this country's cornfield. The largest crop of corn ever produced in this country was that of 1912. It reached the staggering amount of 3,169,000,000 bushels, or considerably more than the record crop of 1906, and much above the average crop of the preceding five years. For reasons which are perhaps economic, or perhaps due to custom, the United States raises three-quarters of the world's crop of corn. As a corn-producing country Austria-Hungary stands next to the United States, with a maximum production of over 200,000,000 bushels, and Argentina, standing third, has a maximum production of a little less than that amount.

The value, too, of the corn crop of this year is the highest on record. The most valuable previous crop was that of 1908, but the value of this year's crop much exceeded it and reaches the fabulous amount of $1,759,000,000. Well did the poet sing, "No richer gift has Autumn poured from out her lavish horn!" The corn crop of this year is worth to the farmer 20 per cent more than the average corn crop of the previous five years.

HAY.

Hay has returned to its old place and is the crop that is second in value. It held this place for many years until in recent times, when it gave place to wheat and then to cotton, but this year cotton is apparently below hay in value. It was a most productive year for grass and hay, and the harvest of hay is measured by 72,425,000 tons. No previous year has equaled this quantity; it is 16 per cent above the average crop of the preceding five years.

The value of the hay crop this year, $861,000,000, has not been equaled. It is immensely more valuable than the crop of 1910, which had held the record. The average value of the hay crops of the preceding five years is exceeded by the value of this year's crop by 21 per cent. The importance of this crop to the farmer is better realized when it is observed that its value is greater than that of the cotton crop and nearly as great as the combined values of the wheat, tobacco, and potato crops.

COTTON.

It is too early to estimate the production of cotton this year, but there is a general agreement throughout the country that the crop will be the second one, considerably below the great crop of 1911 and somewhat above the next highest crop, which was raised in 1904. If the lint produced equals the general expectation, it will weigh about one-eighth more than the average crop of the preceding five years.

In value, as well as in production, the cotton crop of this year stands second. While the production of 1911 was greater, the value of that crop was not correspondingly large, and was exceeded by the much larger value of the much smaller crop of 1910. The crop of 1910 had 11,609,000 bales of 500 pounds and was worth to the producer $788,000,000; the crop of 1911 had 15,693,000 bales and was worth only $661,000,000. The lint crop of 1912 may be worth $735,000,000.

Cotton often demonstrates the frequently observed fact that a crop of excessively high production may not be worth as much in the aggregate as one that is about sufficient for the requirements of consumption. It is a matter of great importance to the farmer that he should not overproduce. Not that he objects to the presence of an abundance of products for their own sake, but that he foresees unprofitable prices. Farmers, in their collective action, endeavor to produce about the quantity of a crop that they can market at profitable prices. An experience of years gives them a rough sort of judgment with regard to this quantity, but they can not foresee what the weather will do to their crops. Having made their planting and sowing plans, it may be assumed, with fairness to themselves and also to consumers, the crop suffers under unforeseen adversities, there is inadequate production, and the general conclusion is that the agriculture of the country is unable to meet national requirements. This conclusion, however, is soon forgotten, and, as a prominent live-stock paper has recently stated, "given three years of real farm plenty and prophets of dwindling food supplies in comparison with population will take down their signs."

To the value of the cotton lint must be added the value of the seed, which in recent years has grown to a very large figure. Not so very many years ago cotton seed was a nuisance to the planter and was worse than worthless. It has now become worth more than $100,000,000. The seed from the crop of this year is estimated to be worth about $117,000,000, or 6.3 per cent more than the average value of the preceding five crops, but it does not equal the value of the seed of the crops of 1909, 1910, and 1911, although it exceeds all other years. Cotton lint and seed should be combined in stating the value of the cotton crop. Together they are worth about $860,000,000, or about half the value of the corn crop and a little less than the value of the hay crop. In value as well as in production the cotton crop of this year has been exceeded by only one year, and that was by 1911 for production and by 1910 for value.

WHEAT.

The wheat crop has lost ground in relative importance of value in recent years. The crop of this year is estimated to be worth to the farmer $596,000,000, an amount which was exceeded by the value of the crops of 1909 and 1908, but no other year. However, it is nearly 2 per cent more valuable than the average crop of the previous five years.

The quantity of the crop, on the other hand, makes a much more favorable comparison with the average production of the previous five years, since it is 11.2 per cent greater. The wheat production of this year amounts to 720,333,000 bushels, a quantity that was exceeded by the 748,460,000 bushels of 1901 and the 735,261,000 bushels of 1906. The crop of this year is third in size and was only 15,000,000 bushels below the next higher crop and only 28,000,000 bushels below the highest production that this country has had. This is a sort of double crop, inasmuch as it is subdivided into spring and winter crops, and had the winter crop of this year done as well as the spring crop did the total of the two might have made a new record.

OATS.

Fifth in order of value is the oats crop. The production this year was extraordinary. It reached an amount 46 per cent above the largest crop previously produced, that of 1909. The season was remarkably favorable to oats, especially in the greater producing States. The crop of 1912 was 1,417,172,000 bushels, or 51.5 per cent greater than the average of the preceding five years.

The price of oats has necessarily declined in consequence of such enormous production, and yet, contrary to the result that has been observed in the case of cotton, the aggregate value of the oats crop this year has not been equaled; indeed, this value is 22.2 per cent above the average of the preceding five years, and amounts to $478,000,000. This is a value within $118,000,000 of the worth of the wheat crop and is a little more than half of the value of the entire cotton crop.

POTATOES.

Sixth in order of value is the potato crop. Its amount is $190,000,000, a low amount for this crop in recent years. The crop of three former years exceeded that of this year in value, and the average value of the crops of the five preceding years was higher by about 3 per cent.

The production of this crop, on the other hand, is higher than has heretofore been reached, and amounted to 414,289,000 bushels, or about 29 per cent above the five-year average. In consequence of the high production of this year, the price of potatoes has fallen to a low figure in some regions. This crop seems to be one of those that are worth less in the aggregate when the production is very high than they are worth when the production is low. The potato crop of 1911, it will be remembered, was deficient and large imports were brought into the country to supply the temporary deficiency, yet the short crop of 1911 was worth $234,000,000, or $44,000,000 more than the abundant crop of this year is worth.

BARLEY.

With a production of 224,619,000 bushels the barley crop of this year far exceeds the largest one heretofore produced. It is an extraordinary production for this country, and exceeds the average crop of the five preceding years by 35.7 per cent. This is a crop that has increased very much during the last 20 years, and even during the last 10 years. Perhaps, in consequence of the extremely high production, the price of barley has declined so as to make the value of the entire crop below that of the record year. This year's crop is valued at $125,000,000, while the crop of 1911 had a value of $139,000,000, although its production was 64,000,000 bushels less. Still, the value of this year's crop is 18.5 per cent above the five-year average.

TOBACCO.

The tobacco crop has not quite risen to the high level of production of most of the other crops, since it has been exceeded by the crops of two former years. The production, however, of 1912 is 959,437,000 pounds, and is 7.1 per cent above the average of the preceding five years. The price of tobacco has risen somewhat, so that the total value of the crop is about 11 per cent above the five-year average. The value of the crop has gained more than the production. The value has not been determined, but apparently it is about $97,000,000, an amount that has been twice exceeded.

FLAXSEED.

Among the smaller crops flaxseed is the most valuable one, the amount for this year being about $39,000,000, or 32.4 per cent above the average value of the five preceding crops. This gain is partly due to extraordinary crop failure in 1910. The production of 1912 has never been equaled and is 44.1 per cent above the five-year average. Its quantity is 29,755,000 bushels.

RYE.

Rye is one of the crops that remain nearly stationary in production and vary little from year to year. The crop of 1912 contained 35,422,000 bushels and is the largest that has been produced by a small margin. It is 10 per cent above the five-year average. The total value of this crop, $24,000,000, has not gained in equal degree, since it increased only 2.3 per cent over the five-year average; and while the production was highest, the total value was exceeded by that of two other crops, those of 1910 and 1911.

RICE.

Although the production of the rice crop can not now be announced, the indications are that it has been exceeded by the production of only one year, and that it is about 8 to 10 per cent above the average production. This crop was damaged by the extraordinary freshet of the Mississippi River last spring, or else the production would, perhaps, have been a record one. The value of this crop is unusually high and is far from being equaled by that of the crop of any former year. It may amount to upward of $20,000,000.

BUCKWHEAT.

A decided tendency to increase in production has been manifested in this crop in recent years. The production of 1912 is the largest since 1868 and is 19.3 per cent above the five-year average. The production is small, as crops go in this country, and amounted to only 19,124,000 bushels in 1912, but the demand for this cereal is increasing and there are practically no exports. The value of the crop of this year is over $12,000,000 and exceeds the five-year average by about 11 per cent. It has been exceeded since 1869 only in one year.

HOPS.

Extraordinary conditions of the world's hop market in 1911 on account of deficient European production have not been repeated this year, and consequently this crop finds a much more normal situation. The production of 1912 is estimated to have been 44,500,000 pounds, or about 1 per cent below the 5-year average, but the total value of the crop is 38.3 per cent above the average and amounts to about $11,000,000.

ALL CEREALS.

All of the cereals except wheat and rice produced their largest crops in 1912, and consequently the total production of this class of crops is far above the average. The gain is 25.6 per cent above the 5-year average. The total production of the seven cereals amounts to 5,609,807,000 bushels, a bulk of food so large as to be entirely beyond understanding. The largest total of any preceding year was 4,958,559,000 bushels in 1910.

The combined value of this great mass of products is a little over $3,000,000,000, and is 15.8 per cent above the average of the previous five years. In no previous year has the value of the cereals exceeded $2,760,000,000, the figures for 1908.

SUGAR.

Sugar is a product of manufacture from the farmers' sugar beets and sugar cane. The farm products can best be treated from the point of view of the manufactured sugar and the by-products.

Beet sugar is a comparatively recent product in this country. The raising of sugar beets for sugar making can hardly be regarded as being an established industry 16 years ago. Beginnings had been made, but the success of the industry was not assured. Under the encouragement of the law, this department and other agencies promoted the growth of this industry, and the industry grew year by year and it became more firmly established.

The latest fruition of all these efforts appears in the magnificent testimonial of the production of 1912. The production of this sugar in 1899, as ascertained by the census, was 81,729 short tons. It increased to 218,406 tons in 1902, to 312,921 tons in 1905, to 501,682 tons, according to the census, in 1909, and to 599,500 tons in 1911. The production of 1912 amounts to about 700,000 short tons, or a gain of about 100,000 tons over the preceding year.

The beet-sugar production of 1912 is about one-fifth of the national consumption of sugar and illustrates what can be done under the protection of the law and in consequence of practical and well-directed efforts.

Beets yield from 10 to 13 tons per acre, and the grower receives from $50 to $70 or more per acre for a crop that leaves his land in better condition after harvest than before. Moreover, the market for the beets is found before the crop is planted. Beet factories furnish in pulp a serviceable stock feed. The growth of this industry and the plans for its increase indicate that beet raising for sugar purposes is much desired by farmers for profit and cultural benefit to the land.

If the by-products of the beet-sugar manufacture are combined with the factory value of the sugar, the total value of the products of the beet-sugar industry in 1912 is found to be about $67,000,000.

The cane-sugar industry fared badly this year on account of the Mississippi River flood. The production of sugar is the lowest since 1899, and the value of the products of the industry, including molasses and sirup, is only about $34,000,000.

The sorghum sirup and maple sugar and sirup industries of the farm produce a value of about $15,000,000 a year, and the total of this amount and of the value of the products of the beet-sugar and cane-sugar industries is about $117,000,000 for 1912. This is a reduction of about $20,000,000 below the combined values of these industries for 1911, but the loss of the cane-sugar industry in 1912 as compared with 1911 is much more than this amount, so that had it not been for the Mississippi flood the value of the products of these industries would have been higher than in 1911, and the amount for that year was the highest reached.

SUMMARY OF COMPARISONS.

The year 1912 was a record breaking one for crop production and crop values. Only two crops had been exceeded twice in production, and these are wheat and tobacco. The high production of buckwheat half a century ago is ignored. Only two crops had been exceeded once in production, and these are cotton and rice. All of the other crops stand at high-water mark—all of the cereals but wheat and rice, the great hay crop, potatoes, flaxseed, and beet sugar.

With respect to value, the only crops that have been exceeded three times are potatoes and cotton seed; the crops exceeded twice in value are wheat, cotton seed, tobacco, and rye; and the crops that have been exceeded once in value are cotton lint, beet sugar, and buckwheat (since 1869). All other crops reached their highest value in 1912, and these included all of the cereals except wheat and rye, the prominent hay crop, flaxseed, and beet-sugar by-products.

INCREASE OVER 1911.

The year 1911 was one of low production, 1912 of high production. The contrast clearly appears when expressed in percentages of increased production. The corn crop of 1912 increased 25.2 per cent above that of 1911; the wheat crop, 15.9 per cent; the oats crop, 53.7 per cent; barley, 40.2 per cent. All of the cereals increased, and the average for them is 30.2 per cent, which expresses the gain of 1912 over 1911 in quantity of production for the cereals. The gain in value was much less, or only 10.8 per cent. Among the gains of other crops in quantity appear 52.7 per cent for hay, 41.5 per cent for potatoes, 53.6 per cent for flaxseed, 16.8 per cent for beet sugar. The only crops for which value increased at least in the degree of increase of production, are rice, sugar beets, and tobacco, while in the case of cotton the production decreased and the value increased.

LIVE-STOCK PRODUCTS.

DAIRY AND POULTRY PRODUCTS.

The dairy cow is one of the principal producers of wealth on the farm, although not prominent in public notice. The farm value of the dairy products of 1912 is estimated at about $830,000,000, an amount which exceeds the value of the cotton lint and is nearly equal to the combined value of lint and seed. The products of the dairy cow are worth nearly as much as the value of the hay crop and are nearly twice the value of the oats crop. The wheat crop is worth only three-quarters as much.

Poultry is another industry of great wealth production on the farm. Here is an illustration of how large an aggregate of an immense number of little things can become. An egg may be worth only a cent and three-quarters, and yet 1,700,000,000 dozen eggs are worth $350,000,000, and these are the estimates for 1912.

If to the value mentioned is added the value of the fowls raised, the products of the poultry industry on farms amounts to about $570,000,000. This is nearly equal to the value of the wheat crop and exceeds the value of the oats crop. It is more than three-quarters of the value of the cotton lint produced this year. The value of poultry products in 1912 has been exceeded in two former years.

Wool production has apparently been exceeded in two former years, yet in 1912 it amounted to 318,548,000 pounds. This wool had a farm value of about $55,500,000, or about 6 per cent below the average value of the wool clip of the five preceding years.

The animals sold from the farm and the animals slaughtered on it together numbered about 111,000,000 for 1912, and the farm value of these animals is estimated to be $1,930,000,000. This is the highest value of animals sold and slaughtered since about 1900, except in 1909 and 1911.

VALUE OF ALL ANIMAL PRODUCTS.

The total value of the animal products of the farm in 1912 is estimated to be about $3,395,000,000. This is a larger value than that of

1911, but is about $150,000,000 below the estimate for 1910, which is the only year that exceeds 1912 in value of animal products produced on the farm.

While the animal products are about one-third of the value of the wealth production of the farm in 1912, the crops are about two-thirds. Their value in 1912 is $6,137,000,000, an amount which is vastly above the high-water mark of total crop value in 1911.

Such are some of the details with which the grand aggregate of $9,532,000,000 has been built to represent the farm value of the wealth created on the farms of this country in 1912. This industry of agriculture has grown to be so great that in discussing such features as these hundreds of millions and billions are common coins of expression.

PRICES OF FARM PRODUCTS.

COMPARISON WITH RECENT YEARS.

CHANGES SINCE 1911.

Farm prices at which the crops of 1912 are valued declined from the prices of 1911 in the cases of some important products. The barley crop has declined about 36 per cent in price per bushel; the corn crop about 10 per cent; the oats crop about 25 per cent; the rye crop about 17 per cent; and the wheat crop about 5½ per cent. The large crop of hay caused a decline of about 19 per cent in price per ton, and the extraordinarily large potato crop suffers a decline of about 43 per cent from the price of 1911. For a reason already stated, there is cause for the decline of about 42 per cent in the price of the hop crop per pound. The flaxseed crop has declined about 27 per cent in price, beet-sugar and cane-sugar crops about 22 per cent.

The price of the cotton crop of 1912 has gained about 25 per cent over that of the crop of 1911, and the price of the seed has gained nearly 5 per cent. The gain of price for the rice crop is nearly 13 per cent, for the tobacco crop about 7½ per cent, and for the wool clip nearly 7 per cent.

Among the dairy products the price of the year's product of butter has increased about 11 per cent over that of 1911, and the price of milk nearly 5 per cent. A decline of nearly 1 per cent is found in the price of the year's production of poultry, and a gain of nearly 16 per cent in the price of the year's production of eggs.

COMPARISON WITH AVERAGE OF FIVE YEARS.

When the price adopted for the crop of 1912 is compared with the mean of the preceding five years, decreases are noticed all along the line. The decrease for corn is 1.4 per cent; for wheat, 9.1 per cent;

for oats, 20.4 per cent; for barley, 13.7 per cent. For cottonseed the decline is 11.3 per cent, and for cotton lint 1.8 per cent; flaxseed, 15.1 per cent; potatoes, 29.1 per cent; wool, 9.8 per cent.

On the other hand, increases of crop prices of 1912 compared with the preceding five years are found in some instances. For rough rice the increase is about 14 per cent; for hay, 2.1 per cent; for tobacco, 2 per cent; for hops, 26.3 per cent; for eggs, 8.5 per cent.

PRESENT RESTORATION OF FORMER PRICE LEVELS.

Prices of farm products for December 1 have been collected by the Bureau of Statistics for many years. If mean prices are computed for decades, a series of price levels can be established and the trend of prices can be better observed. In the case of wheat, for instance, the mean price, December 1, for the United States at the farm was 115.5 cents from 1866 to 1870; it was 99.5 cents from 1871 to 1880; 82.2 cents in the next decade; and 63.2 cents in the decade of lowest prices, 1891 to 1900; afterwards the increase was to 79.6 cents in the decade of 1901 to 1910; and the farm price for 1912 is nearly 83 cents, or about at the level of the decade 1881 to 1890 and considerably below the level of the preceding groups of years back to 1866.

A similar treatment of cotton prices shows that the mean price of cotton in 1868 and 1869 was 14.3 cents; in the following decade it was 12.1 cents, after which it declined, until in the decade of extremely low prices, 1891 to 1900, the price is only 6.9 cents. In the following decade cotton rose to 10.8 cents; and in 1912 it is worth at the farm about 11 cents.

In the case of corn there was a decline on the whole from 52.1 cents as the mean of 1866 to 1870 to 33 cents for 1891 to 1900, followed by the mean price of 48.8 cents in the decade 1901 to 1910 and the price of about 55.5 cents for 1912.

The decline of mean prices of oats was from 39.7 cents in 1866 to 1870 to 26.1 cents in 1891 to 1900, with a recovery to 36.3 cents in 1901 to 1910, and the present price is about 33.7 cents, or substantially a restoration of the price level of the two decades extending from 1871 to 1890.

The price record for potatoes discloses the extremely low position of the price of this year's crop. The mean price for 1866 to 1870 was 56.1 cents, from which there was a decline on the whole to 44.8 cents from 1891 to 1900. The next decade had a price of 58.6 cents, and the price for 1912 is about 45.8 cents, or close to the level of the lowest price period of many years, which was from 1891 to 1900.

The foregoing extracts from price records of the Bureau of Statistics are indicative of the general downward movement of the prices of farm products from the Civil War until it was arrested in about the middle of the decade extending from 1891 to 1900. The subsequent elevation of prices has sometimes carried them to about the level of the earlier years under review, and sometimes higher, but it may be noticed that if comparison is made between present prices and the extremely and abnormally low prices of the nineties the present period of high prices is made by force of the comparison to occupy a relatively higher place than it does if comparison is made with the higher-price periods preceding.

FOREIGN TRADE IN AGRICULTURAL PRODUCTS.

ANALYSIS OF EXPORTS.

HIGH VALUE OF NATIONAL SURPLUS.

Over a billion dollars is, for the fourth time, the value of the exports of farm products. It is sufficient to pay the expenses of the National Government. As long ago as 1878 the value of agricultural exports reached half a billion dollars; by 1892 the amount had touched $800,000,000; and by 1901 it had grown to $950,000,000. The billion-dollar mark was reached in 1907, when the value of agricultural exports amounted to $1,054,000,000. That amount has not since been equaled, but the exports of 1908 and 1911 exceeded a billion dollars in value, and in 1912 the amount fell short of the record exports by only $4,000,000.

RISING QUANTITY OF EXPORTS.

The high value is not entirely due to high prices. The trend of the quantity of the exports of particular commodities can best be understood by using index numbers. Let the quantities of the average yearly exports of the 10 years 1900 to 1909 be represented by 100 and convert the quantities of the exports of other groups of years and of individual years into terms related to that basis. It will then appear that the exports of oleo oil have increased year by year after the period of 1900 to 1909 to the relative amount of 112.3 in 1912. This commodity was exported this year to the value of $13,000,000.

Lard compounds also have increased above the average of the period 1900 to 1909, the relative number for 1912 being 114.8. The exports of this commodity are this year as high as $5,000,000. Various animal oils, not specifically described, have increased in exports during the last three years. Another commodity that is increasing in exports is eggs, which have arisen to the relative number 359.8 in comparison with 100 as representing the 10 years 1900 to 1909. In 1912 the value of these exports amounted to $3,400,000. The exports of mutton amount to only a few hundred thousand dollars in value, but they are increasing, and the relative number for 1912 is 283.1 in comparison with 1900 to 1909.

The exports of cured pork hams declined in 1910 and 1911 to about three-quarters of the average from 1900 to 1909, but in 1912 the exports were very nearly restored to the former amount. Lard is another commodity that has been climbing back to former importance as an exported commodity, and the quantity exported in 1912 is indicated by 88.8. If the exports of pork and of all of its products are consolidated, it will appear that they are rapidly returning to the average exports of 1900 and 1909.

Cotton is the great mainstay of the export trade. Marked increase in exports is conspicuous. Compared with the average exports of 1900 to 1909 represented by 100, the exports of 1890 to 1899 were 79.7; the exports of 1910 were 85.7; in 1911 they were 107.8; and in 1912 the relative number is 147.9.

Apples are supporting an increased export trade, which now amounts to about $10,000,000. The export trade in dried apples is steadily increasing, and in comparison with the average of 1900 to 1909, the exports of 1912 are represented by 159. For fresh apples the exports of 1912 are represented by 124.1. Prunes are a fruit that has reversed the tide of international trade. Its exports now amount to several million dollars a year, and are increasing. During the last three years the exports of this fruit were nearly double the average of the period 1900 to 1909. Raisins have done better yet, and now amount to about four times the average exports of the period mentioned. Their value is more than a million dollars. Glucose and grape sugar, with exports amounting to several million dollars a year, are contributing to the foreign trade annual quantities above the average of the 10-year period mentioned.

To the list of commodities whose exports are increasing and are above the average of the 10 years, 1900 to 1909, or very close to that average, may be added hops, corn-oil cake, cotton-seed oil cake and oil-cake meal, flaxseed oil cake and oil-cake meal, cotton-seed oil, linseed oil, rice, cotton seed, tobacco; and the four vegetables, beans, pease, onions, and potatoes.

The foregoing would be quite a respectable list even though cotton were omitted. Beef and its products have gone into a sorry decline in the export trade, but wheat flour still maintains a high relative showing, as is indicated by 71.2 in comparison with the annual average of the 10 years, 1900 to 1909, and has steadily increased in exports during the last three years. The exports of wheat, including flour converted to wheat, amounted to 80,000,000 bushels in 1912.

The general fact, however, is that the packing-house products have declined in value of exports since 1906, when they reached their highest value, $208,000,000, and have declined still more in quantity because of the increasing prices, yet the value of packing-house exports has increased since 1910 and reached the amount of $164,000,000 in 1912. So with grain and grain products, the quantity in the aggregate is diminishing as well as the value, and the high export values of five and six years ago have not since been equaled. In 1912 the export group known as grain and grain products had a value of $123,000,000.

IMPORTS.

Agricultural imports are steadily increasing in value, subject to some fluctuations. They reached their highest value in 1912, when they amounted to $784,000,000. This was an increase of about $100,000,000 over 1911 and 1910, the years of highest import values preceding 1912. Notable increases are found in the imports of coffee, sugar and molasses, tobacco, wool, and packing-house products, in which hides and skins are very prominent.

LARGE BALANCE OF TRADE MAINTAINED.

It is apparent that since 1908 the balance in the foreign trade in agricultural products has not kept up to its former figure, but, as has already been said, this is not because of diminished export values, but is due to a greater increase of imports than exports. Notwithstanding this, the balance in favor of exports of farm products was as high as $278,000,000 in 1912, and this was higher than the amount for 1910 and also for 1909.

At no time before 1912 have farm products been hard pushed, nor, indeed, closely approached, by products other than agricultural ones in contribution to the balance of trade in favor of all exports. It was not until 1898 that products other than agricultural had a balance in favor of exports, but twice since that time—in 1903 and 1910—the balance was in favor of exports. The balance in favor of the exports of these commodities was only $5,000,000 below the agricultural balance in 1912.

FOREST PRODUCTS.

Forest products were exported in 1912 to the value of $108,000,000, and this was greater than the amount for any preceding year. This is partly due to high prices, yet there were increases in the quantities of the exports of boards, shooks, rosin, and turpentine.

The imports, as well as the exports, of forest products exhibited a marked tendency to increase in value in recent years, and during these years the imports have very much exceeded the exports in value. In 1912 the imports of forest products were valued at $173,000.000, or $58,000,000 more than the foreign and domestic exports.

AGRICULTURAL CREDIT.

SURVEY OF LOCAL CONDITIONS.

INVESTIGATION IN RURAL COUNTIES.

Agricultural credit is a subject that is attracting much attention and exciting a great deal of discussion. The information with regard to what has been accomplished in cooperative credit and in the service of great mortgage banks under governmental supervision must necessarily be derived almost entirely from foreign countries. In addition to this, little is known in regard to local conditions in all parts of this country pertaining to agricultural credit. In view of the possibility of legislation concerning the subject, and more certainly to provide information useful in discussion, the effort was made early in the autumn to collect data of a descriptive sort.

A schedule of questions was sent to 9,000 persons in all of the rural counties of the United States. There were about 3,000 country bankers, about the same number of prominent farmers, and also about the same number of country merchants and men of other occupations taken from the list in use by the Bureau of Statistics to collect monthly reports of the prices of farm commodities. It thus appears that the whole country was thoroughly covered by the schedule. The nature of the questions will appear upon examining the tenor of the answers.

Three classes of correspondents were chosen in order that if any class bias appeared it would be recognized and allowances made for exaggeration or deficiency of statement. It was hardly discoverable that class bias entered considerably into the answers given. Where differences appeared among the classes of correspondents they were probably quite as much due to differences of thoroughness of information as to bias, and perhaps differences in point of view influenced the answers. At any rate the three classes of correspondents reported remarkably well and intelligently, and, no doubt, with faithful and sincere desire to contribute to a truthful description of local rural conditions bearing upon credit.

The questions were so worded as to call for answers in numerical form in order that they might be consolidated and treated arithmetically. A set of tabulations was given to each class of correspondents, and also the three classes were combined after it was observed that the differences were not usually too great to be harmonized. Probably, on the whole, the combination of the returns from the three classes of correspondents into one set of results is often nearer the fact than is indicated by any one of the three classes. However that may be, the chief results of this investigation are herewith presented with the hope that they may be of service.

ABLE TO GIVE GOOD SECURITY.

The first effort of the inquiry was to ascertain the fraction of the farmers owning their land who are able to give good security or indorsed note for a loan. In the opinion of the correspondents, 77 per cent of the farm owners may be so regarded, and the corresponding percentage for tenants is 46; that is to say, about three-quarters of the farmers owning their land and nearly one-half of the tenants are able to give good security or indorsed note for a loan. The farm owners and tenants unable to do this were then dropped from further consideration.

DEFICIENT SUPPLY.

It was next attempted to ascertain what percentage of the farmers owning their land and able to give good security or indorsed note is unable to obtain needed short-time or accommodation loans and advances because of insufficient opportunities to borrow. It appears that 48 per cent of the correspondents reported that farm owners were able to obtain such loans. The other correspondents reported that 36 per cent of the farm owners in their communities were unable to do so.

A similar question pertaining to long-time loans brought reports from 47 per cent of the correspondents that farm owners were able to obtain such loans. The remaining correspondents reported that 40 per cent of the farm owners were unable to do so. The corresponding percentages for tenants are nearly the same. It is easier to obtain short-time loans than long-time ones.

No attempt was made in the schedule to define long time and short time. This was purposely avoided in order that the correspondents might make their answers correspond to the local variations from the general fact. This general fact was that short-time loans were for periods less than one year.

CONSERVATIVE AND PROFITABLE USES.

Correspondents were requested to state what percentage, in their opinion, of the farmers owning their land and able to give good security or indorsed note would use borrowed money beyond the amount, if any, now owed by them, conservatively and profitably. Many of the correspondents answered this question in such a way as to indicate that they did not understand it; but of the answers indicating a correct understanding, 26 per cent reported that no farm owners would so use borrowed money, and the remaining correspondents who answered this question reported that 32 per cent of the farm owners would use borrowed money conservatively and profitably. Almost exactly the same percentages are indicated for tenants able to give good security or indorsed note.

CROP LIENS.

It is with much interest that the answers concerning crop liens have been aggregated. One question asked what percentage of the farmers owning their land, who raise cotton, place a lien on the growing crop to secure advances or supplies; and this question was followed by a similar one as for 10 years ago. In the combined answers of the three classes of correspondents, 7 per cent reported that no farm owners placed liens on the cotton crop; the remaining correspondents reported that 42 per cent of the farm owners did so, and that 52 per cent of them did so 10 years ago. The decline in the percentage therefore is 10 absolutely, or about 20 per cent relatively.

Similar questions were asked concerning tenants; and of the answers, 2 per cent stated that no tenants placed liens on the cotton crop, while the remaining answers showed that 74 per cent of the tenants now place a lien on the cotton crop to secure advances or supplies, and that 77 per cent of them did so 10 years ago. The decrease is hardly perceptible.

Pursuing the subject of crop liens, 29 per cent of the reporting correspondents stated that no farmers owning their land, who raised crops other than cotton, placed liens on such crops, and the rest of the correspondents reported that 24 per cent of the farmers did so. A similar question applied to tenants and brought answers from 17 per cent of the correspondents that farm tenants did not place liens on crops other than cotton, and the rest of the correspondents reported that 40 per cent of the tenants did so.

Information of similar sort was obtained concerning personal-property mortgages. Seventeen per cent of the reporting correspondents stated that no farm owners placed liens on their live stock, farm machinery, or other personal property of the farm; and the rest of the correspondents reported that 25 per cent of them did so. The corresponding percentages for tenants are that in 7 per cent of the communities no personal-property liens were given by tenants, and that in the other communities from which reports were received 43 per cent of the tenants did so.

WAREHOUSE RECEIPTS.

In communities where elevators and other warehouses are employed for storing grain, tobacco, cotton, and other products, warehouse receipts may be pledged as security for loans. It was sought to discover the extent of this practice, and 63 per cent of the correspondents reported that it did not exist, and the remaining correspondents reported that 26 per cent of the farmers holding warehouse receipts used them for the purpose of getting credit.

SOURCES OF CREDIT.

A short analysis of the sources of agricultural credit was attempted and with considerable success. There are often various sources of credit in the same community, and it was hoped that the correspondents would be able to determine the relative importance of each.

It appears that of the principal sources of agricultural loans and advancements (not including purchase money) local banks supply 57 per cent of the total agricultural credit in communities where banks exist; neighbors supply 16 per cent in communities where they contribute anything to the supply of credit; individual lenders in near-by cities and towns supply 12 per cent in communities in which any supply of credit is derived from them; loan agents for outside capital supply 16 per cent in communities where such loan agencies exist; local general stores supply 25 per cent in communities where they contribute anything to the supply of credit; and unclassified sources of credit supply 13 per cent in the communities where these unmentioned sources of supply exist.

Local banks supply more than half of the agricultural credit, general stores supply one-quarter, and both supply more than three-quarters. The supply from neighbors is about one-seventh. The credit that is supplied from a distance, or what may be regarded as the supply from outside sources, is about one-seventh of the total supplied; and consequently it appears that about six-sevenths of the supply is derived from strictly local and near-by sources.

These conclusions apply to the communities in which these sources of credit are found. They are not found in all communities. It was reported by correspondents that in 1 per cent of the communities there was no supply of credit by banks; in 11 per cent of the communities no supply by neighbors; in 39 per cent of the communities no supply by individual lenders in near-by cities and towns; in 51 per cent of the communities no supply by loan agents for outside capital; in 47 per cent of the communities no supply by local general stores; and in 93 per cent of the communities no supply from other sources.

RANGE OF AMOUNTS OF LOANS.

An effort was made to ascertain the range of the bulk of the individual amounts of loans and advances made to farmers owning their land, but not including purchase money. In the opinion of the correspondents, the range is, on the average of answers, from $274 to $1,767; and a similar question concerning tenants indicates a range of $107 to $473.

STORE CREDIT.

There is one source of credit in rural regions in this country that is very prevalent, and yet it is rarely mentioned in discussions of rural credit. This is the running accounts at the stores where the farm owners and tenants buy groceries and other goods without giving security. Correspondents were requested to report with regard to this, and their answers indicate that 59 per cent of the farmers owning their land have running accounts with local merchants and that 53 per cent of the tenants have such accounts in communities where this form of credit exists.

In 1 per cent of the communities it was reported that farm owners did not obtain store credit, and in 2 per cent of them that tenants did not do so. Country merchants sell goods on trust to more than one-half of the farm owners and farm tenants in their communities, and this without security.

RATES OF INTEREST.

Substantially no statistics of rates of interest paid by farmers have been collected in this country since the census of 1890; and consequently it was especially desirable that the correspondents be requested to contribute information in this investigation and report with regard to the subject. Six questions were framed, and these were answered with undoubted understanding as to the meaning of the questions. The results are of much interest.

The questions were expressed in dual form, in such a way as to call for an answer for agricultural loans and also for loans on town and city real estate, the circumstances of the loans being otherwise substantially the same.

The interest rates on the bulk of the purchase money throughout the United States range from 6 to 8 per cent in the case of farms; and also from 6 to 8 per cent in case of town and city real estate. Upon taking account of the differences in rates of interest as between farm and town property, it is discovered that in the case of purchase-money loans 10 per cent of the responses state that the rates are higher for farms than for town and city real estate; 33 per cent report that the rates are lower for farms than for town and city real estate; and 57 per cent report that there is no difference in rates of interest on purchase-money loans between the two classes.

A similar question was asked with regard to short-time loans, with the result that 11 per cent of the answering correspondents reported a higher rate for farms than for town and city real estate, 21 per cent reported a lower rate for farms, and 68 per cent reported no difference.

The same question for long-time loans induced 8 per cent of the responses to report that the rates of interest on farm loans were higher than for those on town and city real estate, 33 per cent to report that the rates were lower on farms, and 59 per cent to report no difference between the two classes of real estate.

COSTS OF BORROWING.

Rates of interest alone do not determine the cost of borrowing. There are commissions, bonuses, and various costs and expenses that are borne by the borrower, and these, if added to the rate of interest, often considerably increase it. It was reported by 22 per cent of the answering correspondents that no commissions were paid in their communities; those who stated that commissions were paid disagreed very considerably. The country banker stated that the rate of commission, when paid, was 2 per cent. The country merchant and persons of other occupations constituting another class of correspondents reported 4 per cent, and the farmers reported 5 per cent. These differences seem hardly capable of reconciling. The terms for which mortgages are made usually range from three to five years, and consequently a commission of from 2 to 5 per cent adds appreciably to the annual rate of interest.

The correspondents were requested to report costs of abstracts, if paid by the borrower, and 94 per cent of the responses reported that the borrower did not pay for an abstract. It appears from the answers by correspondents that in cases where the borrower paid for an abstract of title, or for searching the records, the average cost was $11.40, and in cases where the borrower paid the conveyancer for drawing the papers the average cost was $4.70. Sometimes, too, the borrower was required to pay the registration fee, and when he did so the average cost was $1.50.

COOPERATIVE ASSOCIATIONS.

Finally, it was requested of correspondents to state what percentage, in their opinion, of the farmers known by them and to them would be willing to form an association to receive their own deposits for loaning to themselves, and also to borrow from the outside, on the combined security of the property of all members, money to loan to themselves.

Of the correspondents, 32 per cent reported that there were no farmers who would be willing to form such an association, but the remainder of the correspondents reported that about 40 per cent of the farmers stood ready to organize such cooperative associations.

The foregoing is a brief and highly condensed statement of the chief results of this investigation of local conditions relating to agricultural credit. Numerous variations from the general facts appear in the nine geographical divisions of the States, and still more so in the different States themselves.

WORK OF THE DEPARTMENT IN 1912.

PERSONNEL.

The number of officers and employees on the rolls of the department July 1, 1912, is 1,154 greater than one year ago, and 11,414 more than on July 1, 1897, the first report under my administration. The employees located in Washington number 2,815, while 11,043 are employed elsewhere. There are now 371 more employees of the department in Washington than the entire enrollment 15 years ago, and the number located outside of Washington is 371 less than the total increase, indicating how largely the department's work has changed from office and laboratory work to field and forest investigations.

During the year 45,932 changes of every description were made, including the appointment of 32,975 temporary employments for periods of six months or less, in the forests and fields and on stations in the various States outside of Washington, D. C. The number of persons receiving probationary appointments in the classified service (equivalent to absolute appointment if the appointee is retained in the department after the probationary period) was 1,361. Eighty-four persons were reinstated and 52 were transferred from other departments, 666 resigned, 33 died in the service, and 50 were removed from the service on account of misconduct.

On July 1, 1912, there were 3,938 officers and employees on the statutory roll, comprising positions specifically appropriated for by Congress (a decrease of 70 during the year), and 9,920 were paid from lump-sum appropriations (an increase of 1,284 over last year), making a total enrollment of 13,858, not including temporary "field" employees.

There were 2,257 promotions in salary in all branches of the department and 143 reductions in salary. In the city of Washington 1,972 males and 843 females are employed, and outside of Washington the males number 10,411 and the females 632, the total female employees being 11.9 per cent of the male.

INSECTICIDE AND FUNGICIDE BOARD.

By the provisions of an act approved April 26, 1910, and known as the insecticide act of 1910, this department was made responsible for the collection and examination of samples of articles coming within the meaning of the act, and to report violations of the act to the Department of Justice.

To assist me in this work a board was created consisting of four scientists from the Bureaus of Animal Industry, Chemistry, Entomology, and Plant Industry.

As the first appropriation for enforcing the insecticide act became available on March 4, 1911, the remainder of that fiscal year was occupied with the organization of a working force and the initiation of work.

During the fiscal year 1912, 650 samples were collected, representing 330 different articles, produced by 212 different manufacturers; 246 of these cases have been disposed of, 182 being placed in permanent abeyance, while 64 have been transmitted to the Attorney General for prosecution; 7 of the latter cases have been passed upon by the courts with results favorable to the Government's contentions.

More than 200 hearings have been held during the year, 17 of which were conducted by the Insecticide and Fungicide Board and the others under the supervision of the board. Six special hearings were held by the board to discuss with manufacturers questions relating to the construction and enforcement of the insecticide act.

Six insecticide decisions were issued during the year.

OFFICE OF THE SOLICITOR.

The volume of work of the Solicitor's office has been greater than during any previous year, because of the normal growth of the department's legal business, the passage of the Weeks Forestry Act, relating to the purchase of lands for National Forest reservations, and the claims arising on the deficiency act appropriating funds for the relief of those rendering service during the forest fires of 1910.

Additional work has been called for in preparation of briefs and in correspondence connected with the increased number of violations detected by the vigilance of the department's inspectors under the National Forest law, the food and drugs act, the meat-inspection law, the 28-hour law, the animal quarantine laws, and the insecticide and Lacey acts.

Frequent advice has been given the several bureaus, divisions, and offices on questions of law relating to the discharge of the varied duties intrusted to them, and the Solicitor has attended, as representative of the department, all the hearings conducted by the House Committee on Expenditures in the Department of Agriculture.

FOOD AND DRUGS ACT.

The provisions of the food and drugs act have been vigorously enforced during the year, and 1,459 violations were reported to the Department of Justice, an increase of more than 25 per cent over the number reported last year. Of these, 991 were criminal cases and 468 were recommendations for seizure of adulterated or misbranded foods and drugs.

The first jail sentences for violation of this act were imposed during the year, and there was a tendency on the part of the courts to impose larger fines for first offenses. Fines amounting to $14,000 were imposed in criminal cases, and the costs were generally assessed against the defendants. In the seizure cases, decrees of condemnation and forfeiture were entered against 294 shipments of adulterated and misbranded goods. One hundred and three shipments consisting of filthy, decomposed, or putrid substances, or containing added poisonous or deleterious ingredients, which might render them injurious to health, were destroyed, and in several instances such cases have been reported for criminal prosecution. Six hundred and fifty-five Notices of Judgment of terminated cases have been published, and over 300 are in course of preparation.

WORK FOR THE FOREST SERVICE.

During the fiscal year 1912 the Solicitor rendered 93 formal and 1,148 informal written opinions to the Forest Service on the legal phases of questions arising in connection with the administration of the National Forests. One thousand two hundred and fifty contracts, leases, bonds, and right-of-way stipulations were prepared and examined for sufficiency of execution. One thousand five hundred and sixty-eight cases involving contested claims to lands within the National Forests were handled during the year. These cases involved upward of 400,000 acres of land, supporting many million feet of valuable merchantable timber. Final action was taken by the Secretary of the Interior or the Commissioner of the General Land Office in 622 of the above cases, of which 462 were decided favorably to the United States. The office filed 241 briefs in contested-claims cases during the year and prosecuted 21 appeals, with accompanying briefs, to the Secretary of the Interior from adverse decisions of the commissioner, and made 5 oral arguments before the Secretary. Depositions were taken by the office in 75 cases. Regulations for the administration of the National Forests were revised during the year and upward of 50 proclamations and Executive orders eliminating lands from the National Forests were either prepared or passed upon by the office. The office handled 406 cases of grazing, timber, fire, and occupancy trespasses on the National Forests. Those which were concluded favorably to the Government during the year resulted in the payment into the Treasury of $67,322.54, and in several criminal cases substantial jail sentences were imposed. Punitive, in addition to actual, damages in the sum of $704.70 were recovered during the year in cases involving illegal grazing on the forests. The office passed upon 56 applications for power permits and heard 2 oral arguments of attorneys for applicants for conflicting permits. Upward of 60 complaints, briefs, and indictments were prepared at request of the United States attorneys during the year; 123 claims for relief and reimbursement under the appropriations made by Congress in consequence of the forest fires in the fall of 1910 were examined by the office; and 39 contracts for the purchase of lands for the protection of watersheds of navigable streams under the act of March 1, 1911, were prepared during the year.

TWENTY-EIGHT-HOUR LAW.

Six hundred and thirty-one violations of the 28-hour law were reported for prosecution, as compared with 598 cases reported in the fiscal year 1911. Penalties were recovered in 357 cases, amounting to $28,400. Costs were assessed against the defendants in these cases amounting to $2,937.13. In the fiscal year 1911 penalties amounting to $26,075 were recovered in 258 cases, with costs in the sum of $5,783.85. There were 967 cases pending at the close of the year, as compared with 807 cases pending on June 30, 1911.

LIVE-STOCK QUARANTINE ACTS.

One hundred and thirty-five violations of the live-stock quarantine acts were reported for prosecution. Of these, 124 were violations of the act of March 3, 1905 (33 Stat., 1264), and 11 were violations of the act of May 29, 1884 (23 Stat., 31). The total number of cases of this class exceeded the number reported during the preceding fiscal year by 35 per cent. Fines aggregating $6,125 were imposed in 68 cases prosecuted during the year, and the costs of the proceedings were uniformly assessed against the defendants. In 1911 fines were imposed in 51 cases, amounting to $5,580.

MEAT INSPECTION.

Eighty-five violations of the meat-inspection amendment (34 Stat., 674) were reported for prosecution, a decrease in number of 16 as compared with the fiscal year 1911. Sixty-five cases were prosecuted successfully during the year, and fines were imposed amounting to $4,746.75. In 3 cases sentences of imprisonment were imposed. In the fiscal year 1911 fines amounting to $3,240 were imposed in 43 cases. Four cases resulted in verdicts for the defendant in the fiscal year 1912. In 1911 but 1 case was terminated adversely to the Government. At the close of the fiscal year 71 cases were awaiting prosecution.

INSECTICIDE ACT.

The first apparent violation of the insecticide act of 1910 was reported for prosecution in December, 1911. In all, 58 cases under this statute were reported during the year. Six of these cases resulted in convictions, and in one a decree of condemnation and forfeiture was entered. The goods in the latter case were subsequently released to the claimants under bond after payment of the costs. The Insecticide and Fungicide Board has completed its organization for obtaining evidence of violations of this statute.

LACEY ACT.

Thirty-four cases involving the unlawful shipment of game were reported for prosecution under the Lacey Act (secs. 242 and 243, Penal Code). The Biological Survey has arranged, through cooperation with State officials, to trace such shipments more effectively, and it is expected that this plan will contribute materially to the detection of violations of this statute. Six cases presented during the year 1912 resulted in convictions. In one case the defendant was acquitted.

OTHER WORK.

Three hundred and fifty-seven contracts and leases were prepared for the several bureaus, offices, and divisions of the department, in addition to those prepared for the Forest Service in the field. During the fiscal year 1911, 339 contracts and leases were prepared for the same bureaus, offices, and divisions.

Nineteen applications for letters patent on inventions of employees of the department, for dedication to the public, were filed in 1912, more than double the number filed in 1911. Ten patents were allowed during the year and 2 were disallowed. In 1911, 10 patents were allowed and there were no disallowances.

During the fiscal year ending June 30, 1912, 20 claims for balances due the estates of as many employees of various branches of the department who died intestate were examined, the necessary papers prepared for the payment of the same, and advice furnished administrative officers of the department relative thereto.

PUBLICATIONS OF THE OFFICE.

In addition to the 655 Notices of Judgment published by authority of section 4 of the food and drugs act and discussed in detail in another part of this report, the office issued 11 circulars, embodying decisions of the courts construing the statutes intrusted to the department for execution. Six of these embodied decisions on cases arising under the 28-hour law, 3 under the food and drugs act, 1 under the National Forest administrative act, and 1 a decision of the Attorney General under the meat-inspection law. There was also published during the year a supplement to the annotated edition of the 28-hour law issued on October 2, 1909, thereby bringing up to date the original edition. The office also published a compilation of references to the legislative history of acts of Congress enforced by the department for use in connection with the construction of any of the provisions contained in such statutes.

At the close of June 30, 1912, the office had in preparation a revision of the compilation entitled "Laws Applicable to the Department of Agriculture," the first edition of which was published in 1908, and embraced a compilation of all statutes, in effect at that time, applicable to the Department of Agriculture. There was also in preparation an appendix to the Use Book of the Forest Service embracing all of the general laws, reference to which is found necessary in the daily administration of the National Forests.

WEATHER BUREAU.

INVESTIGATION AND RESEARCH.

A series of practically continuous explorations of the upper atmosphere extending over the last five years has been concluded at the Mount Weather Observatory with highly satisfactory results. It has been shown beyond question that the meteorological conditions disclosed by kite flights are often susceptible of utilization in the preparation of weather forecasts. The data for the five-year series of observations are in course of summarization and will soon be in suitable form for further study. A report on the sounding-balloon ascensions made in the Western States in 1909, 1910, and 1911 has also been completed and published in the Mount Weather Bulletin. On the whole, this report forms the most important contribution to the meteorology of the higher atmosphere thus far made in this country. The atmospheric conditions at extremely high levels as disclosed by the balloon flights are not wholly in accord with the conditions that have been found to exist at similar levels over continental Europe. It is evident that further explorations of this character will be necessary in the United States to confirm the results arrived at in the report mentioned.

Studies of temperature conditions on mountain tops and in adjacent valleys have been continued at Mount Weather and elsewhere and the conclusions relating thereto published in the Mount Weather Bulletin. The results obtained have tended to fix the relation between prevailing weather conditions and the character and degree of temperature changes that may be expected to follow in the valleys below. These studies have an important bearing on the question of air drainage and, in their practical application, to the protection of fruit in the valleys and on mountain slopes given over to its production.

FORECASTS AND WARNINGS.

The forecasts and warnings issued by the Weather Bureau for all interests liable to be affected by coming weather conditions were verified in every important instance. The world-wide survey of atmospheric conditions presented by the synoptic charts for the northern hemisphere has continued to be of great value in the preparation of general weather and temperature forecasts for the United States for a week in advance. During the year the field of observation over the northern hemisphere was materially extended, reports having been added from the Aleutian Islands by wireless and from stations in Japan and China by cable. Cable observations are also being received daily from an increased number of stations in Russia.

By direction of the Secretary the Chief of the Weather Bureau visited England during the year for the purpose of taking part in the International Radiotelegraphic Conference held at London on June 4 to July 6, inclusive. As a result of his intercessions, which were indorsed by all the delegates from the United States, the conference agreed to an international regulation which shall give weather observations the right of way over all messages except distress calls. This is an important regulation and will make it possible in time to organize complete ocean weather services, the value of which to life and property through the issue of warnings to shipping at sea can not be estimated. A valuable extension already inaugurated in the weather service is the receipt by radiotelegraphic communication of reports from vessels at sea along the middle and south Atlantic coasts and in the Gulf of Mexico and Caribbean Sea, those being the regions traversed by tropical storms before reaching our coasts. With the further perfection of the wireless service these reports will become of increased importance.

Among the more striking weather features successfully forecast during the year were: The cool weather following the prolonged hot wave in July, 1911; the hurricane of August along the Georgia and Carolina coasts; the freezes in the west Gulf States in November; the severe freeze in California during December; the record-breaking cold wave of January; and the heavy snowfalls in the Middle West during the winter of 1911–12. The warnings issued in advance of the two severe freezes in the west Gulf States in November enabled sugar, orange, and truck growers to protect crops to the value of several million dollars that would otherwise have been lost. During the December freeze in California the citrus crop, valued at $40,000,000, suffered damage to the amount of about $6,000,000. This loss resulted from an inadequacy of facilities for general smudging. Where smudging was done, not only the fruit buds but trees in bloom were saved from injury. But for the frost warnings of the Weather Bureau at this time and the cooperative efforts of the orange growers the loss would have approximated $20,000,000.

RIVERS AND FLOODS.

The flood in the lower Mississippi River during the spring and early summer of 1912 was the greatest in its history, and entirely overshadowed similar disasters in other portions of the country, although numerous and widespread floods occurred elsewhere during the year, the Pacific Coast States alone escaping on account of deficient precipitation. In the Mississippi flood all previous high-water marks were exceeded from Cairo to the Passes except in the vicinity of Vicksburg, Miss. The flood began in March and reached its maximum at New Orleans, La., early in May; at the end of June the flood waters were still flowing through the Hymelia crevasse above New Orleans. Of the entire territory subject to overflow about 17,600 square miles, or 59 per cent, were flooded. The losses are believed to have reached $75,000,000, and may possibly reach $100,000,000, the greater portion representing the loss of the season's crops. In its forecast of flood stages and its warnings of danger to residents in the threatened territory the bureau maintained the high degree of accuracy characterizing its previous flood work on the Mississippi River. Through the flood warnings many lives were saved. The forecast for the highest stage in the river at New Orleans was issued nearly five weeks in advance, and its absolute accuracy, despite complications caused by crevasses and subsequent heavy rains, was a triumph of forecasting skill. A report on the Mississippi flood, already begun, will be prepared jointly by the Department of Agriculture, the War Department, and the Department of the Interior, each department dealing only with such features as come within its particular province.

Floods elsewhere were forecast with the usual timeliness and accuracy. The total flood losses reported during the year were about $86,000,000, of which about $11,000,000 were incurred outside the lower Mississippi Valley. These figures are far from complete; it is reasonably certain that if all losses were reported and more detailed statements obtained the total would be brought up to at least $110,000,000, against a total of less than $8,000,000 for the year ended June 30, 1911, and of about $14,000,000 for the year before. The total value of property saved through the flood warnings of the past year is estimated at $19,000,000.

The measurement of the winter snowfall was continued in the mountain regions of the West as a basis for the forecasting of the amount of water likely to be available for agricultural and commercial purposes during the succeeding spring and summer. While this work is still in an experimental stage, the forecasts based on the surveys and measurements made in the Maple Creek (Utah) watershed in the spring of 1911 were of much value to water users, and the surveys and measurements made in the spring of the past year promise equally valuable results.

The study of the effect of forests on climate and stream flow has been continued in the Rio Grande National Forest, Colo., during the past year, and complete data for nearly two years have now been obtained. It was at first thought that this study, carried on at a great elevation and in a supposedly semiarid region, would not afford a basis for legitimate comparison with data obtained from the more humid regions of the East, but it now appears that the final results will permit of more general application than was earlier supposed. Observations of a similar character, though more limited in scope, are being made in other national forests in Minnesota, Idaho, Colorado, Utah, Arizona, and California.

OBSERVATIONS AND REPORTS.

The observations and reports furnished by the 197 regular Weather Bureau reporting stations of the first order form, in the main, the basis for the weather maps and general daily weather information issued to the public. In addition to these, however, there are 75 special meteorological stations that render telegraphic reports and that are maintained as adjuncts to the work of the forecaster in making special frost predictions for the fruit, truck, vineyard, and cranberry interests of the various portions of the country. Of the 158,636 telegraphic observations due from these stations during the year, only 1 was missed, and that through an accident to the observer.

Of the special services devoted to the interests already mentioned, that carried on in relation to the fruit industry has been given the greatest extension during the year. These extensions have been made largely in California, Oregon, Washington, Idaho, Utah, Colorado, and North Carolina. In North Carolina numerous "orchard" stations have been established, and a special investigation is being made in the Blue Ridge Mountains in regard to the thermal belts that are particularly favorable for the development of the fruit industry, owing to their practical immunity from damaging frosts. In addition to the services already mentioned, observations were taken at more than 400 special stations in the corn, wheat, cotton, sugar, and rice growing States, and daily statements of temperature and rainfall were issued during the growing season in the interest of the staple crops produced in the districts covered by the reports. There are also about 4,000 cooperative stations at which daily observations of weather and temperature are made and from which monthly reports are received by mail. These reports are of value in establishing the climatic conditions of the country.

The distribution of Weather Bureau forecasts and warnings has been extended wherever practicable during the year, by means of the telegraph, telephone, and mail service, the total number of persons receiving the forecasts daily by telephone alone being estimated at more than 5,000,000 at the close of the year.

The distribution of daily weather information by means of weather maps was largely increased through the extension of the publication of weather maps in the daily newspapers. This form of issue is now being made in 147 papers, with a total daily circulation to nearly 3,000,000 subscribers.

MARINE WORK.

The Weather Bureau has continued the preparation of meteorological charts of the North and South Atlantic, North and South Pacific, and Indian Oceans, and of the Great Lakes. These are published monthly, except the South Atlantic and South Pacific, which are issued quarterly. The charts portray graphically the meteorological elements over the oceans and contain much additional information of interest to mariners. The meteorological data upon which they are based are collected from vessels of all nationalities. During the past year 2,291 vessels, representing 24 different nationalities, cooperated with the Weather Bureau by furnishing reports of observations; reports were also received from 261 land stations, making a total of 2,552 cooperating marine observers.

On April 1, 1912, the Weather Bureau inaugurated on the Atlantic and Gulf coasts a vessel weather service on 30 vessels sailing between New York and New Orleans and points in the West Indies. These vessels are equipped with barometers, and take observations twice daily when 70 miles or more from the port of departure or port of entry. These observations are radiographed to the nearest wireless station on the coast and sent thence over the land lines to Washington, where they are utilized in the preparation of weather forecasts and warnings. A vessel weather service has also been started on the Pacific coast. Arrangements have also been made for the broadcast dissemination of forecast messages and storm warnings over the ocean, to the extent that the present service will permit, through cooperation with the Naval Wireless, the United Wireless, the Marconi, and the United Fruit Telegraph services on the Atlantic, Gulf, and Pacific coasts.

A vessel-reporting service, providing for the prompt transmission of communications between interested organizations and individuals regarding passing vessels, wrecks, and marine disasters, has continued in operation at the Weather Bureau stations at Block Island, Cape Henry, Sand Key, Southeast Farallon, Point Reyes Light, North Head, Port Crescent, and Tatoosh Island. This service is especially comprehensive in its operation at the Cape Henry station, which reported not less than 19,876 passing vessels during the year.

Numerous instances were reported where the Weather Bureau observers on the lookout at these reporting stations sighted vessels in distress and sent out the word that brought the revenue cutters and the tugs of wrecking companies to the rescue.

NEW APPARATUS.

Rain and snow gauges having special shield devices were installed for comparative observations at stations in Colorado, Yellowstone Park, and Utah during the year. In all cases the records of snowfall obtained from these gauges were from 20 to 25 per cent greater than those obtained by the ordinary snow gauge. Further structural modifications will be made in these gauges in order to overcome difficulties that are still encountered in the effort to obtain a catch that will represent the true amount of precipitation.

Special instrumental equipments were installed at stations in Minnesota, Idaho, Utah, and California, in connection with experiments being carried on in cooperation with the Forest Service.

Instruments for obtaining records of humidity and temperature have been supplied to the Bureau of Mines for use in a study of the causes and prevention of mine disasters.

The study of conditions favorable for the formation of frost in the fruit districts of the country has called for a large distribution and installation of instruments at the special observing stations.

Weather Bureau kiosks constructed for the display of weather instruments at conspicuous places in large cities were furnished to 10 additional stations during the year.

The development of special apparatus for the measurement of solar radiation was extended during the year, and a number of stations in the West and Southwest were equipped with pyrheliometers for the purpose of making observations.

Special instrumental devices for the study of wind movement at high velocities have been developed during the year. By means of the tests proposed through their use it will be possible to determine the higher wind velocities more accurately than now secured by means of the cup anemometer, it being recognized that the velocities as at present obtained are increasingly erroneous with the increase of the rate above 50 to 60 miles an hour.

SCHOOL OF INSTRUCTION.

There has been established at Mount Weather a school of instruction at which newly appointed assistant observers will be given a thorough training in the meteorological and other duties to which they will later be assigned. The observation station will be conducted exactly as a regular station of the bureau. The course of instruction includes a training in observational methods and the preparation of meteorological reports and in the construction and upkeep of meteorological instruments.

BUREAU OF ANIMAL INDUSTRY.

THE MEAT INSPECTION.

The meat inspection, which is carried on at slaughtering and packing establishments engaged in interstate or export trade, continues to show an increase in volume and has about reached the limit of the standing annual appropriation of $3,000,000 made by the law of 1906. To provide for the future extension of this work, which is necessary if it is to be applied to all products and establishments coming within the law, an increase of $300,000 has been requested in the estimates for appropriations for the coming fiscal year.

During the fiscal year 1912 inspection was conducted at 940 establishments in 259 cities and towns. There were inspected at time of slaughter 59,014,019 animals, consisting of 7,532,005 cattle, 2,242,929 calves, 34,966,378 hogs, 14,208,724 sheep, and 63,983 goats. This constitutes an increase of over 6,000,000 in the total number of animals inspected as compared with the preceding year. The greatest increase was in hogs, of which over 5,000,000 more were slaughtered in 1912 than in 1911. There was a slight decrease, however, in the number of cattle. On account of disease or other unwholesome condition 203,778 entire carcasses and 463,859 parts of carcasses were condemned, making a total of 667,637 carcasses condemned wholly or in part. The condemnations were as follows: Cattle, 50,363 carcasses, 134,783 parts; calves, 8,927 carcasses, 1,212 parts; hogs, 129,002 carcasses, 323,992 parts; sheep, 15,402 carcasses, 3,871 parts; goats, 84 carcasses, 1 part. Tuberculosis continued to be the cause of a high proportion of condemnations of cattle and hogs. In addition to the foregoing condemnations at the time of slaughter there were condemned on reinspection 18,096,587 pounds of meat and meat food products that had become unwholesome or otherwise unfit for food since the inspection at the time of slaughter.

Inspection certificates issued for exports of meat and meat food products during the year covered 1,114,279,558 pounds. This was a slight increase over the preceding year. Farmers and retail butchers and dealers are exempted from inspection by the law, but supervision is given to interstate shipments by such persons. During the past fiscal year 116,536 shipments were made by retail butchers and dealers holding certificates of exemption, the products so shipped amounting to 20,493,837 pounds.

During the year 26,889 samples of various products were examined in the meat-inspection laboratory for the purpose of detecting prohibited preservatives or coloring matter, adulterants, and unwholesomeness of various kinds, and passing upon the purity of condiments, water supplies, etc. The results show no attempts to use prohibited preservatives and coloring matters. The condemnations resulting from laboratory inspection have been made principally because of rancidity of oils and fats and the use of cereals in prepared meats without proper declaration on the label.

By comparing the census figures and the department's statistics it is calculated that in 1909 (the year covered by the last census) 58.12 per cent of all the meat slaughtered in the country was Federally inspected. As the Government inspection has been slightly extended in the subsequent three years, it is estimated that the proportion slaughtered under Federal inspection at the present time is about 60 per cent. Most of the uninspected remainder consists of slaughter by local butchers and by farmers.

HORSE BREEDING.

The horse-breeding investigations in Colorado, Vermont, and Iowa have continued with good progress. In the Colorado experiments in breeding carriage horses there were in the stud at the close of the fiscal year 77 animals, including 22 stallions and 55 mares. Of 14 foals dropped during the year 11 are alive and thrifty. The average excellence of the foals is above that of previous years.

At the Government Morgan horse farm at Middlebury, Vt., there were at the close of the fiscal year 69 animals, consisting of 19 stallions, 44 mares, and 6 geldings (work horses). One stallion, 1 mare, and 2 fillies of approved type and breeding were purchased in Kansas and added to the stud during the year. One of the stallions is still leased to the Massachusetts Agricultural College for breeding purposes. During the breeding season of 1912 an opportunity was given to farmers in Vermont to breed to stallions at the Morgan horse farm under the provisions of the plan for Army-horse breeding.

The culling of inferior animals is continued each year by a board of survey, so as to retain in the Colorado and Vermont studs only such individuals as conform to the desired types.

In the cooperative work of breeding gray draft horses at the Iowa Experiment Station there are 3 stallions and 9 mares. Four foals were produced during the year.

A good start has been made with the plan of breeding horses suitable for Army use, as outlined in last year's report. Two stallions were stationed in Virginia for breeding with approved mares, and during the year 38 mares were bred and 11 foals produced. It is too early to report upon the foals, but it is evident that farmers owning mares of satisfactory type are willing to have them bred to the Government stallions on the terms proposed by the Government. With the provision made by Congress this work will be extended during the coming year, and it is hoped that within a few years a considerable number of suitable horses will be available for the Army.

CATTLE BREEDING.

In the breeding of Holstein cattle in cooperation with the North Dakota Experiment Station good results were obtained during the year, although the records made by the cows were not as large as during the preceding year because of shortage of feed production. Six heifers were put into the Advanced Registry during the year. A large number of grade heifers have been sold from the circuit, and the surplus pure-bred bulls have been sold readily, most of them going to farmers in the immediate vicinity. The benefits of the work are therefore not confined to the herds in the circuit.

A substantial increase in the production of milk and butterfat was made by the herds in the cooperative experiment in breeding milking Shorthorn cattle at the University of Minnesota. There has been an increase of almost 1,000 pounds of milk per cow during the last two years. At the end of the fiscal year the department's cooperation in this work ended.

SHEEP AND GOATS.

Experiments in sheep breeding are being carried on in Wyoming, Vermont, and Maryland. In the Wyoming investigations, in which an effort is being made to improve the wool and mutton qualities of range sheep, the wool clip of the past year was the best in quality obtained since the experiment was inaugurated, although the average weight was slightly less than in the preceding year. The Southdown flock, at the Morgan horse farm at Middlebury, Vt., has done well. A good lamb crop was secured, and the wool clip was the best since the flock was founded.

Experiments in breeding sheep and goats are also in progress at the farm of the Bureau of Animal Industry at Beltsville, Md., where various breeds are being crossbred with Barbados and Karakule sheep. The object of the goat-breeding experiments is to obtain a strain of milking goats. An exceptionally good crop of kids was obtained this year.

POULTRY AND EGG INVESTIGATIONS.

The experiments in breeding Barred Plymouth Rock fowls for increased egg production at the Maine Experiment Station are approaching a close, as the final solution of the main features of the problem of the inheritance of egg production has been reached. These results will be made available in publications.

Studies of the commercial fattening and marketing of poultry in the West have been continued and some of the results published.

In the endeavor to reduce the loss from bad eggs the department advocates the production of infertile eggs; that is, eggs from hens that are not allowed to run with male birds. It is estimated that the losses from bad eggs amount to $45,000,000 a year, and that one-third of this is caused by the formation of "blood rings" due to the development of the germs in eggs by heat. If farmers and poultrymen will produce infertile eggs, this part of the loss can be prevented, and the losses can be further reduced by proper methods of handling and marketing. What is known as the "loss-off" method of buying eggs—that is, buying on a quality basis—is advocated, and cooperative work to establish this method has been carried on in some of the leading egg-producing States. Publications, including a poster, have been issued showing the advantage of producing infertile eggs.

THE ERADICATION OF ANIMAL DISEASES.

Continued progress was made during the year in the systematic work of eradicating certain diseases of live stock. As a result of work which is being carried on in cooperation with State and local authorities for the eradication of the ticks which transmit the contagion of Texas fever of cattle, 22,827 square miles of territory in the South were released from quarantine, and since the close of the fiscal year 2,248 additional square miles have been released. The total area freed from ticks and released from quarantine since the beginning of this work in 1906 now amounts to 164,896 square miles, which is nearly one-fourth of the total territory infested at the time the work was begun. The pioneer work is naturally the hardest part of the task, and it is believed that with adequate appropriations more rapid progress can be made in the future. It is evident that the days of the tick are numbered and that the South will soon enter upon an era of the development of stock raising and will have a large part in meeting the needs of our people for a greater supply of meat.

The work of eradicating scabies of sheep and cattle in the West, which has been under way for many years, is nearing completion. The area released from the sheep scab quarantine during the fiscal year amounted to 9,177 square miles.

An outbreak of dourine among horses appeared in Iowa early in the summer of 1911 and has been entirely eradicated, although horses involved in the outbreak had been as widely scattered as Texas, Arkansas, and Canada.

TUBERCULOSIS.

Further experiments in the vaccination of cattle to prevent tuberculosis confirm the previous conclusion that this method is not safe and can not be recommended in the present stage of its development.

Such vaccination involves the use of living tubercle bacilli of a mild strain, and it is found that these mild germs sometimes remain in the vaccinated cattle for some years and are discharged in the milk. It appears, therefore, that the result of such vaccination would be to harbor the infection in a mild form in some cases.

The bureau has continued its work for the suppression of bovine tuberculosis by applying the tuberculin test in certain sections of the country where cooperative arrangements have been made with State and city authorities, and also by testing breeding and dairy cattle for interstate shipment. The testing in Virginia and Maryland shows over 18 per cent of tuberculous cattle among those tested for the first time, and only 3 per cent in herds to which the test had been previously applied and from which the reacting animals had been removed. In the District of Columbia the proportion of tuberculous cattle on first test in previous years was nearly 19 per cent, but on retests made during the past year it was only a little over 1 per cent. As a result of this work a large number of previously infected herds are now being maintained free from tuberculosis.

HOG CHOLERA.

Officials in various States and farmers and stock raisers generally have shown increased interest in the work of combating hog cholera through the use of the serum developed by the Bureau of Animal Industry. At the present time 30 States are distributing serum. In most of these States the serum is prepared in official laboratories, but a few of the States purchase their supply from private manufacturers and distribute it to the farmers at cost. In some of the States preparing their own serum no charge is made to the farmers for the serum, while in other States the cost price of manufacture is charged. Up to this time considerably more than 1,000,000 doses of hog cholera serum have been manufactured and applied in all of the various States combined, and the results are reported by State officials generally as being very satisfactory.

The demand for hog-cholera serum has been greater than could be met by the State laboratories and has led to its preparation by commercial firms. In order to insure that only a reliable quality of serum is sold in interstate commerce it is desirable that the department should be given legal authority to supervise the preparation of the serum.

The scientific investigations of the past year with regard to hog cholera have been devoted to determining the best methods of preserving by means of chemicals the hog-cholera virus that is necessary in the production of the serum. Experiments have also been made to learn whether or not the offspring of immune sows are likewise immune to hog cholera, and it seems evident that pigs from such sows are themselves immune at birth and that this immunity lasts for at least three weeks.

INVESTIGATION OF OTHER ANIMAL DISEASES.

The scientific staff of the Bureau of Animal Industry has continued the investigation of the causes and nature of various diseases of live stock. Perhaps the most important work of the year has been that relating to infectious abortion. This disease rivals tuberculosis as a plague of the cattle industry. The germs causing infectious abortion frequently occur in milk, and have also been found in the tonsils of children, where they have probably been conveyed by milk. Inoculation experiments show that these germs have the power to produce distinct lesions in guinea pigs. Just what effect this organism may have on human health has not yet been determined, but our present knowledge seems to afford another reason for the pasteurization of milk as a safeguard against various infectious diseases.

What is known as the complement-fixation test has been found to be an exceedingly reliable and prompt means of diagnosing certain diseases the determination of which has hitherto been attended with some uncertainty and delay. The bureau has extended the use of this test to a number of diseases.

That rabies (or hydrophobia) is a continued menace is shown by the fact that 183 animals suspected of having this disease were sent to the pathological laboratory for diagnosis, of which 112 cases were found to be positive. While most of the cases occur in dogs, an unusually large proportion of cats were received. The best known means of getting rid of this disease is the muzzling of all dogs for a sufficient period. Muzzling orders are sometimes issued, but it is difficult to secure their thorough enforcement.

Among other diseases concerning which investigations were made during the year are forage poisoning, or cerebrospinal meningitis, swamp fever, dourine, tetanus, chronic mastitis, and Malta fever. It seems that the latter disease has existed among goats in Texas and New Mexico for many years. It is passive in goats, but causes serious illness in man, to whom it is communicated from the goats. It is important that steps should be taken to eradicate this disease from the goats, especially since there is a growing tendency to use goats' milk as food for infants and invalids. The infection of man may be guarded against by pasteurizing goats' milk where there is any reason to suspect that the infection may be present.

DISTRIBUTION OF VACCINE, ETC.

During the year 1,340,380 doses of blackleg vaccine were prepared and distributed to stock raisers by the Bureau of Animal Industry.

Reports of the use of this vaccine continue to show the same favorable results as reported in previous years, when the death rate showed a reduction to less than one-half of 1 per cent.

Tuberculin and mallein are furnished to State, county, and municipal officials for the diagnosis of tuberculosis and glanders, respectively. During the past year 329,771 doses of tuberculin and 135,699 doses of mallein were sent out.

EXPORT AND IMPORT ANIMALS.

During the fiscal year there were made 209,715 inspections of American and 27,270 inspections of Canadian animals for export. The number of animals actually exported was 142,564. The greater number of inspections is accounted for by the fact that many of the animals were inspected two or more times. This work also includes the supervision of vessels, of which 314 inspections were made.

For shipment to Canada there were inspected and tested with tuberculin 858 cattle, and inspected and tested with mallein 25,110 horses and 1,426 mules. There were also inspected for shipment to Canada 58,783 sheep, 234 goats, and 39 hogs. For shipment to the Hawaiian Islands there were tested with tuberculin 130 cattle and with mallein 317 horses and 346 mules.

A strict inspection, with quarantine in certain cases, is maintained over all animals imported from foreign countries, in order to exclude the numerous animal diseases which are prevalent in other parts of the world. For this purpose hay, hides, wool, etc., are also inspected and disinfection required. The total number of import animals inspected during the year was 379,822, and of these 3,542 were quarantined in accordance with the regulations.

DAIRY FARMING.

The work for the development and improvement of dairying in the South has been continued, and similar work has been extended in the West. The object is to introduce dairying in new sections and to improve dairy methods, including the breeding and feeding of the herds, as well as the handling of the milk. This work is being done in cooperation with State authorities and institutions. There is a particularly fine field for dairying in the irrigated regions of the West where alfalfa is produced. In the South and West 167 silos were built as a result of their advocacy by the department. A larger number are contemplated for the coming year. In some regions the silo is practically unknown, and when one is built it serves as an object lesson to the entire community.

Dairy farmers are also encouraged to keep accurate records of their herds, so that they may know which animals are profitable and unprofitable and get rid of the latter. By this method the breeding of herds is steadily improved, better feeding methods are adopted, the average production of cows is increased, and greater profits are obtained.

The cow-testing association is another means of promoting the improvement of dairy herds, and embodies also the keeping of herd records. There are now 97 active cow-testing associations in the United States out of 118 which have organized since 1905. One of the greatest difficulties is to secure efficient men to supervise the associations.

MARKET MILK INVESTIGATIONS.

The work for the improvement of market milk has been continued and consists mainly in introducing and maintaining the score-card system of inspection, assisting in competitive exhibitions of milk and cream, and investigating the conditions surrounding the milk supply in various places. During the year cooperative work has been carried on with 21 cities and 11 States. Practically all cities in the country are now using some form of score card; the department has records of 170 such cities. Some of the handicaps to obtaining a milk supply of good quality are that municipalities fail to provide sufficient funds, the inspection work is sometimes made inefficient by political domination, and consumers fail to appreciate the fact that the production of clean milk involves additional expense. In campaigns for better milk the attempt is too often made to place the entire cost of improvement on the producer. Some incentive ought to be offered to the producer to supply the higher grades of milk. The fact is that most consumers are not demanding a high grade of milk, especially when this involves slight additional cost. It is well recognized that the health authorities of the country generally are seeking to give the public a higher grade of milk than the public is demanding or is willing to pay for.

DAIRY MANUFACTURES.

Work is being conducted with a view to assisting creameries in better methods of operation and business management and in improving the quality of their products. Reports were received from 1,500 creameries during the year, and on the basis of these reports advice has been given by correspondence and sometimes by visits for the purpose of remedying defects and bringing about needed improvements. The grading of cream is recommended as a method of securing better cream and producing better butter. Although there has been some improvement, a great deal of inferior cream is still received at creameries and buying stations, and much of this is utterly unfit to be made into a food product. Investigations during the year showed that 61 per cent out of 5,154 lots of cream were of third grade—that is, dirty, decomposed, or sour—and that 94.5 per cent of the creameries investigated were insanitary to a greater or less degree. Pasteurization was practiced in only 27 per cent of the creameries. These conditions make a system of inspection of dairy products very desirable. Recommendations on this point are contained in the report of the Chief of the Bureau of Animal Industry.

DAIRY RESEARCH LABORATORIES.

The dairy research laboratories have continued their work upon various technical problems connected with milk, butter, and cheese. Extensive experiments regarding the influence of breed, individuality, and feeds on the composition of milk are under way at Columbia, Mo., in cooperation with the State agricultural experiment station, and some of the results of this work are in course of publication.

Work on the manufacture of butter for storage has been completed, and the results consistently show a much higher keeping quality in butter made from sweet pasteurized cream than in butter made in the usual way. Aside from the commercial advantages, butter made by this method is much safer for human health, as pasteurization removes the danger from disease germs that are liable to exist for considerable periods in butter made from unpasteurized cream.

The investigations concerning the Swiss, Cheddar, Camembert, and Roquefort types of cheese have been continued and additional knowledge has been obtained which will be of value in the production of those kinds of cheese. The experiments with European varieties of soft cheese have been carried far enough to indicate the possibility of making cheese of the Camembert type in this country, although no manufacturer has appeared to be entirely successful as yet.

BUREAU OF PLANT INDUSTRY.

A review of the work of the Bureau of Plant Industry for the fiscal year 1912 is included in the Record of Sixteen Years, see pages 117 to 144.

BUREAU OF CHEMISTRY.

POULTRY AND EGG INVESTIGATIONS.

The conservation policy of this department is being extended to the saving of foodstuffs that are now wasted, so that our people may continue to have enough wholesome food to eat. The farmer produces a good article, but because of deterioration during marketing it is sometimes an inferior food when it reaches the consumer, or, worse still, it is destroyed as unfit for food before marketing. The Food Research Laboratory is studying the preservation of quality in perishable products as well as the prevention of decomposition.

Better methods have been devised for the handling of dressed poultry from producer to consumer and their adoption by the industry is growing. It is this phase of the work, however, which must be pushed if the scientific findings of the laboratory and field experimentation are to yield more food and better food to the people and surer returns to the industries. Years of study have shown that in most instances it is comparatively easy to determine in the laboratory and by experimental observation wherein the shipper errs or the middleman fails; it is an extremely difficult matter to get this information to the shipper or middleman in such wise that he will understand, believe, and apply it. The publication of accounts of the work is helpful, but personal contact between the investigators and the industries is infinitely more effective. Visits to individual packing houses are most prolific of results, but comparatively few people can be reached in this way. Addresses at meetings and conversations with their representatives are the most helpful and economical means now had for reaching a large number of people. Last year about 7,500 people, including producers, shippers, railroad men, warehouse men, food inspectors, health officers, educators, and consumers, were interviewed, and 137 packing houses which are handling eggs and poultry visited.

A field branch has been maintained in Tennessee for more than a year, during which time, in Kentucky and Tennessee, the number of packing houses equipped with mechanical refrigeration, without which it is impossible to handle poultry and eggs well, has increased from 2 to 6, and the tonnage from 48 to 160, and a number of additional plants are being seriously planned, with a consequent increase in tonnage. The poultry and eggs shipped from the up-to-date houses using improved methods have lost the name of "southern" and are in demand in northern markets, where they command good prices. It is also possible and profitable for these houses to ship to the North the entire year instead of allowing the eggs to rot on the farms and the poultry to accumulate, because the hot season is of long duration and the decay very heavy.

During the year a traveling refrigerator has been made by the installation of mechanical refrigeration in a refrigerator car. This permits the taking of improved methods into rural districts, where it is otherwise impossible to convince the people what good handling, combined with refrigeration, can do for their produce.

Information has been given the consumer to aid him in his purchase of good and economical food; as, for example, the facts concerning the loss and deterioration of poultry when chilled in water and shipped in ice. Every 20,000 pounds of dressed poultry absorbs on an average 1,300 pounds of water, and about 300 pounds of the most nutritious and appetizing food material of the flesh of the birds is dissolved out and goes down the sewer. The keeping time of " wet packed " birds is also much shorter than that of " dry packed," hence the waste from decay is much greater.

A preliminary statement of the work accomplished in the investigation of the handling of frozen and dried eggs has already gone to press. Cooperative work was carried on with six egg-breaking plants during the summer of 1911. The fundamental principles of good handling and sanitary requirements were worked out. For the egg-breaking season of 1912, four establishments were equipped to handle eggs in accordance with the new principles. The improved quality of the products has demonstrated that, so handled, frozen and dried eggs are not only wholesome, but a desirable addition to our food supplies; and, further, they preserve for use a large amount of one of our most nutritious foods which would otherwise be lost to the people. The investigation has also demonstrated most forcibly that research work, carried on cooperatively with the industries handling perishable products, can within a short space of time revolutionize the quality of a food product and conserve for the people much food material that would, without such cooperative investigation, be absolutely lost.

CANNING OF FOODS.

The work now in progress involves a detailed study of the canning and preserving of fruits. A special laboratory has been so equipped that it constitutes a miniature canning and preserving factory, with a bacteriological laboratory attached for the study of the organisms normally present in the fresh and decayed products.

An attempt has been made to stop the practice of partially filling the cans with food and adding a sufficient amount of water to fill to the required content. The study of the action of tin on canned foods has been continued and the results published.

FRUIT PRODUCTS.

During the past year the Bureau of Chemistry has installed at Los Angeles, Cal., an experimental plant known as the Citrus By-products Laboratory, which, during the coming winter and spring, will be used in testing out methods for the utilization of citrus by-products. Laboratory work gives every indication that citric acid, oils of lemon and orange, sterilized and concentrated orange and lemon juice can be produced from the cull lemons and oranges, now a waste product. In the work on the processing of Japanese persimmons it has been found that all varieties can be satisfactorily processed on a large scale by keeping them in carbon dioxid for a time varying with the variety and the temperature. A study on a small laboratory scale has been made of the drying of fruits in vacuum, together with an absorbent for water vapor, such as unslaked lime. The fruits which have been examined for the identification of their acids in order to determine the changes of composition during their manufacture into fruit products included many varieties of apples, pears, strawberries, raspberries, blackberries, cherries, currants, gooseberries, quinces, huckleberries, apricots, and peaches. The shipping of fresh raspberries and blueberries from New Brunswick and Prince Edward Island to Boston by boat, so that they reach the factories in a badly fermented state, has been investigated and conditions improved in some cases where the factories have been moved to the Maine border. The work of the Enological Section has included studies on the composition of the ripe fruit of grapes, of the fruit of grapes during ripening, of grape juice, and of the fruit of apples. Studies with yeast organisms comprised incubation studies to determine the fermenting power at low temperature.

SUGAR AND SUGAR PRODUCTS.

The investigation of the maple products industry of the United States has been continued with special study of the effect of metals on the appearance and composition of the sirup, the changes in composition of maple sugar and sirup in storage, and the effect of manufacture from sour sap. Analyses have been made of cane sirup, various grades of cane molasses, and sorghum sirup to note the chemical means of differentiating these sirups from one another. About 1,120 samples were received for analysis during the year, some requiring only single determinations, but many complete examinations.

DAIRY PRODUCTS.

The greater part of the work on dairy products during the year was on evaporated, condensed, fresh, and dry milks, cheese, and butter. Milk campaigns were carried on at Providence, R. I., Cincinnati, St. Louis, and Philadelphia to determine the character of the interstate milk shipped to those cities. It is believed that this work has been of great assistance to the local authorities in their campaigns for a satisfactory milk supply.

MICROCHEMICAL STUDIES.

As a result of the field work and the enforcement of the food and drugs act regarding certain tomato products, notably pulp and ketchup, almost revolutionary changes have been taking place within the last few years in the methods of their manufacture. A large number of manufacturers have changed or are remodeling their plants to meet the demands for a clean, sound product. The old methods have been largely abandoned, as they proved wasteful and deleterious to the product.

An investigation concerning the coloring and facing of teas was undertaken at the request of the Treasury Department. This investigation resulted in the devising of a new method for this determination, which, with slight modifications, has been adopted as the official method of the Treasury Department to be used by the tea testers of that department.

In the line of routine work, 1,298 interstate samples and 3,066 miscellaneous samples have been examined; these included spices, fruit products, dried fruits, cattle foods, eggs, nuts, sausage, mince meats, olives, candies, chocolate, cocoa products, teas, coffees, infant and invalid foods, and textiles.

PLANT PHYSIOLOGICAL CHEMISTRY.

The past year's work of the Plant Physiological Section has included investigations on starch and starch products, potato drying, graham flour, canning tomatoes, and baking powders containing small amounts of calcium sulphate. The special work comprised investigations in bread making and macaroni manufacture and also baking tests with flavoring extracts and with various egg products.

SPECIAL INVESTIGATIONS.

The study of the presence of arsenic in shellac and gelatin and other foods has been continued. A prominent feature of the vinegar work has been the determination of formic acid in vinegar adulterated with acetic acid made from pyroligneous acid. In cooperation with the various health authorities of several States, much good work has been accomplished by joint investigation and examination of the waters, oysters, and clams from various beds. As a result, many oyster sections which have shown pollution have been closed by State authorities as a source of edible oysters.

DRUG INVESTIGATIONS.

The Drug Division has been engaged in studying the composition, adulteration, and misbranding of drugs and chemicals, including those products imported into the United States or shipped in interstate commerce and found on our markets. Color reactions for the purity of asafetida have been established, as well as a quantitative constant in the lead number of the purified resin. The same reactions were carried out on the well-known adulterants of asafetida. Attention has been given to the estimation of morphin, showing that morphin sulphate used in hypodermic tablets is usually adulterated with codein. The caffein investigations have been continued with special reference to certain factors modifying toxicity, such as starvation, variation of temperature, and fatigue. The action of caffein on the circulation, with special note of the drugs modifying its effect, has been studied extensively.

The total number of samples examined during the year is 1,544, of which 294 were of synthetic products, 49 of essential oils, and 392 of chemical reagents.

INSPECTION OF FOOD AND DRUGS.

More than 10,000 official samples of foods and drugs were collected by the inspecting force of the bureau during the past year. Approximately 1,500 factory inspections were made to secure information on the sanitary conditions of the establishments and the general practices as they affect the enforcement of the food and drugs act. The samples were referred to the inspection laboratories in Washington and the 22 branch laboratories in different sections of the country, where analyses were made to learn whether the products were being sold in compliance with the law.

In addition to the original analyses made for inspection or investigation work, check analyses were made and cases were prepared for the consideration of the Board of Food and Drug Inspection in the Washington laboratories of the bureau. The Drug-Inspection Laboratory reported 809 samples examined, of which 604 were domestic products. Of these, 132 (22 per cent) were found to be either adulterated or misbranded or both. The Food-Inspection Laboratory reported the study of approximately 5,000 analytical reports of domestic samples, most of which were by the branch laboratories. In 2,034 instances the reports showed violations of the law, and cases were prepared for the consideration of the Board of Food and Drug Inspection. About 7,800 analytical reports on the import food cases were considered, in addition to 741 special cases, 558 of which were reported to the Treasury Department as representing adulteration or misbranding under the act and 183 were recommended to the Secretary of Agriculture for release.

Other executive work in connection with the food and drugs act is the distribution of check samples, the receiving and recording of food samples sent to Washington, and the care of seeing that the proper exhibits are sent to the United States attorney concerned in each of the cases reported for prosecution.

WATERS.

Mineral and table waters as found at source and as they appear on the market have been examined. As a result of the examination of

202 interstate samples of water, 18 were reported to the Board of Food and Drug Inspection as adulterated, and 2 seizures were made. Of 43 import samples 8 were found to be adulterated or misbranded and their exclusion recommended. A study of the mineral springs of the United States at source has been continued, and information covering the springs of New York, New Jersey, and Pennsylvania has been made ready for publication. This is the first attempt that has ever been made to make a systematic investigation of American mineral springs. The results will be of the greatest value to physicians, users of various waters, chemists, and those engaged in the enforcement of the national food and drugs act or State laws of a similar character. A study of methods of determining lithium in mineral waters has been completed and the results published, which will be invaluable to water analysts and those engaged in enforcing food laws. Special investigations have been made of the pollution of the Potomac River and the effect of such pollution on oysters and other shellfish. More extended work must be performed along this line before the results are ready for publication.

INSECTICIDES AND FUNGICIDES.

The chemical work on insecticides and fungicides has included studies of the composition and methods of manufacture of these products, as well as the effect they have upon the foliage, with the idea of increasing their efficacy, suggesting methods of avoiding injury to fruit and foliage, and suggesting to the farmer or fruit grower how to prepare such products where this is practicable. Such studies as these have resulted in and will result in a great saving to the farming community, both in the initial cost of insecticides and fungicides and in the saving from using insecticides and fungicides which will not burn vegetation. During the year 293 domestic samples of insecticides and fungicides (other than cattle dips and closely allied preparations) and 25 foreign or import samples have been examined under the provisions of the insecticide act of 1910. This act was designed to prevent the misbranding and adulteration of such goods, and its good effects can already be seen by users of these commodities. Of the 293 domestic samples examined, 131 were reported to the Insecticide and Fungicide Board as adulterated or misbranded, and of the 25 foreign samples 14 were recommended for detention at the port of entry. Considerable attention has been devoted to improved and new methods for examining insecticides and fungicides, and in consequence of this work not only have the methods of examining various miscellaneous insecticides and fungicides been worked out, but methods for examining such standard preparations as lime-sulphur, Bordeaux mixture, and Bordeaux lead arsenate paste have been materially improved. An investigation relative to the toxic effect on fruit trees of certain elements, notably copper and arsenic, which may accumulate in the soil as the result of using compounds containing these substances as sprays, has been under way for the past two years and is now practically completed and the results are ready for collation and publication. The results of this work will be of the greatest value to fruit growers and agriculturists in determining whether or not permanent injury to vegetation through the medium of the soil is to be feared from repeated application of poisonous insecticides and fungicides.

CATTLE FOODS AND GRAINS.

Five hundred and four samples of cattle foods and grains were examined in the course of the year in connection with the enforcement of the food and drugs act. Of these, 89 were reported to the Board of Food and Drug Inspection as adulterated or misbranded. The work on cattle foods and grains has also included the examination of various samples for the solving of such economic problems as the feeding value of forage and range crops and improved methods of handling corn after harvesting.

LEATHER, PAPER, ROSIN, AND TURPENTINE.

Work has been done on bookbinding, carriage, automobile, and furniture leathers showing that the same harmful practices prevalent in the tanning of sole and other heavy leathers exist among the producers of these leathers. Experiments have been continued on the utilization of waste long-leaf pine for making paper and the recovery of wood turpentine, rosin oils, and wood creosote. Standard, nonfading type samples of rosin have been devised and are expected to promote the correct grading of rosin and at the same time to prove more economical to the official graders. The work on production of wood turpentine, its refining, its value as a paint and varnish thinner, and its effect on the workmen using it in paints has been continued, and the information thus obtained will be used in new experiments.

EXAMINATION OF CONTRACT SUPPLIES.

The investigations of rubber goods and paint materials have been continued with good results. Attention has been given to platinum laboratory utensils and enamel-ware cooking utensils. Improved methods have been devised for testing inks and typewriter ribbons. The samples examined for other departments of the Government during the year number 2,442, in addition to 1,800 pieces of apparatus examined for the Bureau of Chemistry.

FOREST SERVICE.

The work of the Forest Service is, of course, both investigative and administrative. The investigative work has for its field the discovery of the best methods of handling woodlands and the best methods of utilizing their products. The administrative work is that involved in protecting and developing the National Forests and in cooperating with States for fire protection of the watersheds of navigable streams under the Weeks law. While the investigative work is fundamental for the application of right methods on the National Forests as well as elsewhere, the strictly administrative work takes the lead by far in importance, as measured by volume and cost.

In my report last year I set forth in some detail the necessity of basing the administrative work on sound technical methods. It is equally necessary that the administrative policy accord with sound business principles. As use of the forests develops, certain questions of business policy are sure to come to the fore. With nearly eight years of National Forest administration behind me—years which in sober truth deserve to be called epoch-making, for within their compass a complete system of regulated use giving permanence to vast resources has been developed almost from nothing — and bearing in mind the years ahead in which that system will be tested by its results, I may well call attention at this time to the principles which underlie the present business policy and to the reasons why that policy should, in my judgment, be continued.

The National Forests contain about one-fifth of the standing timber of the country, but furnish only about one-eightieth of the annual cut. They produce by growth more than 10 times the amount of timber which is now being taken from them each year. While the forests of the country as a whole are being greatly overcut, so that our timber capital is diminishing yearly and rapidly, the National Forests are rising reservoirs of supply. The forests of the East and South particularly are subjected to an accelerating drain by the heavy demands of the general market, and to the extent that the weight of this overdemand can be relieved through the use of a greater proportion of western timber, the best permanent interests of the country will be promoted. A large part of the present stand of National Forest timber is ripe for the ax, so that the sooner it is cut the greater will be the production of new timber by growth and the less the waste through decay. All these facts point to the conclusion that the cut from the forests should be increased by every possible means.

This conclusion, however, can not be accepted unqualifiedly. There are considerations of public policy which weigh on the other side. I should have failed in my duty if I had made volume of cut my sole object. Leaving entirely out of account the need for imposing conditions which will secure the production of the best new timber crop, it is necessary to regulate cutting with a view to the protection of the best interests of the public in the long run. Lumber is one of the things the price of which enters into the cost of living—and more largely, perhaps, than is generally realized. That cost should be kept down; but the cost of living to-morrow must not be lost sight of in dealing with the problem of the cost to-day.

Our economic dependence upon the forest is complete. Nothing is more certain than that national foresight must be employed in conserving the supplies that we have left. This is a fundamental part of the policy now in force on the National Forests. First consideration is always given to local needs. These are supplied partly under the provisions for free use of timber by settlers, prospectors, and others, partly through sales. The annual requirements of the localities in the vicinity of the National Forests at the present time may be put roughly at about 300,000,000 board feet under sales and 140,000,000 feet under free use. The amount which could be cut each year without exceeding the annual production by growth is over 6,000,000,000 feet. Most of this is therefore available as a surplus over local needs for the supply of the general market. But it is not an evenly distributed surplus. Some of the forests have no surplus at all; every foot of timber that they can supply as a sustained yield will be needed for the support of local industries now in sight. On such forests, and on forests approaching this condition, no sales whatever to supply the general market would receive consideration from me for an instant. Thus, for example, all the timber on the Deerlodge Forest, in Montana, is reserved to supply the mines at Butte. Other forests are now producing timber in enormous excess over local needs. The Cascade National Forest, in Oregon, adds through growth 200,000,000 feet a year to the available supply, while local needs now call for only about 1,000.000 feet a year. From such forests (and they are many) the general market can draw heavily without endangering local industries.

Provision is made for disposing of timber in three ways. To bona fide settlers, miners, residents, and prospectors I am authorized to allow the use of timber for domestic purposes without charge. If I sell timber to homesteaders and settlers for their domestic use, I am required to do so at actual cost. In other sales I am required to sell at not less than the appraised value, and if the sale exceeds $100, only after public advertisement for at least 30 days.

In other words, the law now recognizes that timber from the forests should be made to contribute to the development of the country by home builders, and to the development of mineral resources by prospectors and miners, without the requirement of payment when payment may not reasonably be expected; that if the home builder buys for his own use, the Government should seek reimbursement of expenses, not profit; but that otherwise the Government should obtain the market value of the timber, and should seek to have that value fixed by competition unless the amount involved is too inconsiderable to make the procedure involved worth while.

When National Forest timber is sold it is the duty of the Government to protect the public against monopoly. To secure a monopoly profit there must be such control of a particular market as will enable those having the control to charge an unfair price. From the beginning the Forest Service methods of selling timber have been devised with a view to preventing timber monopoly by purchasers. A fair operating profit to the purchaser in his investment is permitted, but no more. Through stumpage appraisal a minimum price is fixed, below which the timber will not be sold. This price is based on a close estimate of the cost of manufacture and the market price of the product. The sale is then advertised, and competition is sought through publicity. In advertising for bids the right is reserved to reject any bids acceptance of which would tend to establish monopoly conditions. Wherever opportunity offers, sales are made to competing firms. If it appears that monopoly control might take place through business affiliations of apparently independent operators, a certified statement of the relation of an applicant or bidder to other purchasers, or a certified statement of the membership of firms or lists of stockholders in corporations, may be required. Bids from lumber companies which have large holdings of their own may be rejected in order to give preference to companies not so supplied, and companies which are operating under one sale may be refused another sale until the first is completed. Thus by the exercise of administrative discretion in the acceptance of bids and in the location of sales a regulative principle is applied to that part of the lumber industry which utilizes National Forest supplies.

The necessity for careful provision against monopoly has become more conspicuous during the past year because of the larger bodies of timber which are now being offered for sale, with proportionately longer cutting periods. In my report for 1911 I made mention of the fact that three sales had been advertised on terms which would permit the cutting to extend over from 7 to 10 years. Such sales offer the only means by which lumbering can be extended into many districts where cutting should begin at once. Immense bodies of mature timber which should be harvested to prevent deterioration and to make room for new growth are unmarketable for lack of means of transportation. Usually railroad development is the recourse for lumbering them. Naturally no one will undertake to build from 30 to 100 miles of railroad into a mountainous wilderness without assurance of tonnage for a considerable term of years. To meet this situation a large-sales policy has been worked out. It includes provision for periodic readjustments of stumpage prices, based on the changes which take place in lumber prices in the markets where the timber is sold. The result of such sales is to secure railroad development, opening the way to general economic development, in entirely new fields; to make available for early use timber, much of which would otherwise rot in the woods; and to tap additional supplies of timber which can be sold to other purchasers once the means of getting it to market has been created.

The first necessity in making such sales is that the transportation facilities developed shall be public. This is always made a part of the contract. Railroads constructed for the operation must become common carriers. Taken with the other safeguards against monopoly already described, the stipulations on this point are fully adequate to protect the interests of consumers. Two sales of this character were concluded during the year, and a score are now pending. While it is not to be expected that all of these will be put through, a large increase in the annual cut is practically assured through the adoption of the large-sales policy.

This policy in no sense supersedes that which seeks to encourage small sales. On the contrary, it not only supplements that policy but also extends the opportunity for its application. The small mill, sawing for local supply, will enter the territory opened up by the large operation as population flows in and trade, industry, and agriculture develop. Out of a total of 5,772 separate sales made last year, 5,557 were for amounts under $500.

The general principles which guide the timber-sale business as a whole, therefore, are three:

(1) Except for sales to settlers and homesteaders who want the timber for their own domestic use, the actual market value of the timber as it stands is secured.

(2) Artificially high prices to the consumer through monopolistic control of local markets are carefully guarded against.

(3) The field of lumbering operations and the volume of cut are being enlarged wherever an opportunity exists, and new opportunities are being sought; except that the cut is not allowed to exceed the sustained annual yield, nor are sales for the general market allowed on forests where the local demand will utilize all the timber that the forest can steadily produce.

Pressure will undoubtedly be brought to bear increasingly as time goes on and market prices go up for sales on some other basis than that of the actual value of the timber. It will doubtless be said, as it has been said already, that the Government by withdrawing the National Forests from private acquisition has reduced the amount of timber on the market and so increased the cost of lumber, and that by making purchasers pay the full value of what they buy it has levied on the necessities of the public. I have tried to point out that, far from being withdrawn from the market, the timber of the National Forests is being pushed upon the market. Ten times the quantity sold last year would have been sold if purchasers could have been found. By withdrawing the forests from private acquisition the Government has increased the amount of timber on the market, for it prevented the absorption of their finest stands by the speculators who now hold for the rise enormous quantities of the best timber in the West. By making purchasers pay the full value of what they buy the Government has simply done justice to all instead of permitting a favored few to profit at the expense of the many. While it has been collecting the actual worth of all timber sold, the Government has been doing everything that it has power to do legitimately to keep prices down by offering as much timber as possible for sale and by regulating sales to prevent the collection of a monopoly toll from the public. Any proposal looking to the sale of timber at prices below its actual market value will require to receive the closest scrutiny to discover who will in point of fact be its actual beneficiaries, and at whose expense.

AGRICULTURAL LANDS IN THE FORESTS.

While the National Forests comprise the great mountain regions of the West and in general have neither the climate nor the soil nor the topography that would make cultivation possible, there are exceptional localities and many scattered patches of land which are adapted to tillage. As originally proclaimed, the forest boundaries included much more land of this character than they do now. Naturally the lower-lying parts of the forests were the parts in which such lands were generally found. The early work of examining lands which were under consideration for National Forests was necessarily hasty, for a small force had to cover a great territory in the shortest possible time if the forests were to be saved to the public. In consequence the lines were drawn somewhat roughly. In places they took in too little land, elsewhere too much.

A revision of all boundaries, based on careful examinations and land classification, has been under way for three years and has resulted in the elimination of about 10,000,000 acres which were found not to be chiefly valuable for forest purposes. In making these eliminations an effort has been made to exclude all important nontimbered areas chiefly valuable for agriculture and located along the borders of the forests or running back from the borders into the forests. Many deep indentations which the maps now show indicate where valley lands extending for miles up the course of a stream have been thus excluded. The result has been to reduce largely the amount of agricultural lands in the forests.

To a large extent fertile and relatively low-lying land included in the forests had, previously to their establishment, been taken up. This is true both of heavily timbered valleys and of open lands. The traveler passing up a valley and knowing that he is within the Forest boundary is often misled by what he sees. The land which appears to be withdrawn from agricultural development through reservation by the Government is very likely owned by a timber company or speculator. If the value of the standing timber on such land is much greater than its value for farming in its uncleared state, it is practically certain to be held primarily for its timber. Agricultural development of such land is effectively blocked not because the land is in a National Forest, but because it pays the private owner best to leave it uncleared until he can realize on the timber to good advantage. Many quarter sections of such land have on them timber worth over $20,000.

Thus a large part of the land still left in the forests which could be cultivated successfully is accounted for. It has passed into private ownership. In spite of the fact that, in redrawing the boundaries, areas on which most of the land was alienated were so far as practicable eliminated, there are still some 22,000,000 acres of the forests which the Government does not own. Of that which the Government does own, not over 4,000,000 acres is agricultural. Of this amount a large percentage is heavily timbered. Such lands are at present not being opened to settlement, because to open them would be simply to turn them over to timber speculators. To prevent an indefinite tying up of the land because of its timber value, I shall first, and as soon as possible, sell off the timber on them, and then list them for the benefit of the bona fide homesteader.

That there was need for provision for opening lands capable of serving their best use through agriculture I early recognized. This department advocated the enactment of a law to make this possible. The necessary legislation was secured in the act of June 11, 1906. Under the terms of that act I was authorized to list for homestead entry, upon application or otherwise, lands found upon examination to be more valuable for agriculture than for forest purposes.

Since this act was passed I have listed nearly 1,250,000 acres of agricultural land. At the outset it was impracticable to do more than examine lands for which applications were made. As time passed, however, it became apparent that a systematic segregation of the larger tracts was called for. This was first undertaken in the boundary readjustments already described, and in some special classification work, particularly in northern Montana. Following completion of the field work on the boundaries, plans were formulated for a thoroughgoing classification of areas which that work had not reached.

Agricultural development within the forests is highly desirable not only because it carries out the fundamental principle of putting every kind of land to its most productive use but also because the administration of the forests is made easier by the presence of settlers. A forest put to work is a very different thing from a wilderness. The more people it has living in it the better. They are needed to use the resources. They are also needed to help protect the forests. Settlers assist in locating fires and in putting them out. They are available for extra help in the construction of improvements and similar work. Their farms become to a certain extent bases of supply. In its plans of organized fire protection the Forest Service now arranges with settlers to take a definite part in the work, and thus forms what may be called the secondary line of defense. There is every reason why the settlement of lands more valuable for agricultural use than for forest use should be welcomed and facilitated.

A comprehensive plan of land-classification work for the general determination of agricultural lands within the forests received my approval in April of the present year. Under this plan the land will be classified on the basis of full data with regard to all important factors. Questions relating to soil will be passed upon by specialists from the Bureau of Soils. In fact, a complete scientific determination will be made not only of the relative value of the land for field crops and for forest crops, but also of the relative value of different areas for farming, and of the kind of farming that will be most successful. To this work the entire department will contribute. The applicant for land will be able to learn not merely that he may settle in a certain place, but the relative value of all lands open and the crops and cultural methods which will utilize to best advantage any specific area. In this way I believe that the principle of putting every kind of land to its best use will be carried out more effectively than has ever been possible before and with greatest benefit to those who seek to make settlement in the forests.

Partial provision for this work was made by an appropriation of $25,000. To carry the work forward on the scale planned much more liberal provision for it should be made, and I strongly urge that the appropriation be increased.

In listing tracts for settlement a difficulty which is of serious importance in some cases is created by the need to reserve rights of way over the land. In narrow valleys a single farm may bottle up a large and valuable body of timber if no right of way exists across it, or it may block entrance to agricultural land lying beyond. When the need of a right of way can be foreseen it is now surveyed out in advance and described in the patent; this, however, is both costly and unsatisfactory, for it can not always be told where the right of way should run. Authority should be given to the Secretary of the Interior to express in the patent the reservation of rights of way for governmental purposes and to meet the needs of settlers.

WORK OF THE YEAR.

With field enlarged by the extension of the work under the Weeks law, providing for the acquisition by the Federal Government of forested lands on the watersheds of navigable streams, and with a material gain in efficiency and increase in output in old lines of work, the total cost of all Forest Service activities was lowered from a little over $5,900,000 in the fiscal year 1911 to about $5,530,000 in 1912. The 1911 expenditures, however, included the heavy disbursements necessitated by the great forest fires in the fall of 1910. Notwithstanding this fact it is beyond question that the Forest Service got last year larger and better results for every dollar expended than ever before. This is due to the constant study of efficiency in organization and improvement of the administrative mechanism.

The work of readjusting the National Forest boundaries was continued, with the result that during the year a net reduction in the total area of the forests was effected, amounting to something over 3,000,000 acres.

In States in which it is still possible to add to the forests new areas which should be included, the boundary readjustments added last year not quite 250,000 acres. To the six States (Washington, Oregon, Idaho, Montana, Wyoming, and Colorado) in which additions to the forests by presidential proclamations are forbidden Congress added, near the close of the last session, California. The gross area of all forests at the close of the year was about 187,500,000 acres and the net area about 165,000,000 acres.

To consolidate the National Forest holdings and to provide for satisfaction of the equity of States having unsurveyed school lands within the forests, agreements providing for an exchange with the States of South Dakota and Idaho of such school lands for other lands of equivalent acreage and value, lying in solid blocks along and within the boundaries of the forests, were entered into. The agreement with South Dakota affects about 60,000 acres. Surveys to determine the area which Idaho will exchange were under way at the close of the year. Other exchanges affecting both State and private lands are pending. Legislation to permit this policy to be applied more broadly is needed.

Cooperation with the Department of the Interior through reports on mining claims within National Forests when patent is sought was continued. These examinations are the only means of protection which the Government has against fraudulent acquisition of National Forest lands sought under the guise of mining claims for water-power sites, timber speculation, range monopoly, and other purposes. In making them, careful provision is made to safeguard all the rights of claimants, and no unfair or burdensome restrictions are imposed on the mining industry. Unfavorable reports on claims are made only after examination by fully qualified mineral examiners and practical mining men. Reports to the General Land Office on all kinds of unpatented claims covered 1,869 such claims, of which 1,534, or 82 per cent, were reported on favorably.

Receipts from the National Forests increased over $140,000, or about 7 per cent. The major part of this increase was from the receipts from timber sales. A much more active demand for timber was apparent during the year and resulted in large sales which make certain a very large increase in future receipts from this source.

The total receipts from all sources were over $2.100.000. Twenty-five per cent of this amount goes to the States in which the forests are located, as county, school, and road funds, and an additional 10 per cent of the receipts of last year were made available by Congress for expenditure in the States within which the receipts were obtained, for the construction of roads and trails within National Forests. These roads and trails will be primarily for the benefit of communities, and cooperation with communities will be sought in carrying out the work. At the same time the development of the forests will be to some extent aided through the additional facilities furnished. I consider this a wise and beneficial expenditure, and I recommend that the appropriation be renewed.

PROGRESS IN FOREST MANAGEMENT.

The total stand of timber on the National Forests, including Alaska, is now the equivalent of nearly 600 billion feet. Plans for thorough protection of this timber against destruction by fire and for the development of the forests to permit the harvesting of the mature timber, and studies of methods by the application of which the highest productivity will be assured and a constant yield provided for, were materially advanced. The progress made in constructive application of the principles of forestry, in the interest of the best public welfare, to the enormous area and widely varying conditions of the National Forests has been immense. Considering the brief time since the application of forestry by the Government began, an accomplishment quite without parallel in any other country has been achieved. How great the public service which has been rendered is, it is almost impossible to realize. Its character is fundamental, for it has established a firm and safe basis on which will be reared the future system of intensive use.

FOREST FIRE LOSSES OF THE YEAR.

Not quite 2 acres per thousand were burned over during the calendar year 1911. On only a very small part of the area burned over was any considerable percentage of the merchantable timber destroyed. The estimated damage was about $355,000, nearly equally divided between damage to timber and damage to reproduction and with a small loss of forage value.

During the last half of the fiscal year 1912 very few fires occurred. This was partly because of unusual weather conditions, partly because of the great gain in efficiency of protection and the development of the system of roads, trails, telephones, lookouts, and other permanent improvements. Much still remains to be done and large expenditures must be made before the forests will be safe against disastrous fires; and the present protective force is far too small. The saving of public property, to say nothing of the protection given to private property and to life which follows from efficient fire protection, makes failure to provide for such protection not merely most short-sighted economy but an almost criminal neglect. Better manned and better equipped forests are a matter of primary importance. The advance in the development of an enlightened and vigorous public sentiment on the subject of forest fires and in organized protection of private holdings in National Forest regions has been a prime factor in lowering the fire risk and is a matter of great importance. That this advance has taken place is due first of all to the example furnished by the Forest Service and to the education of public sentiment which it has brought about. An adverse influence has been temporarily created in localized regions, particularly in northern California, by the agitation of the theory of "light burning." This has brought about an increase in incendiarism in certain localities, due not to malice but to the mistaken idea that forest protection is promoted by letting fires run over the ground frequently. This would mean in the long run forest destruction, for it prevents the renewal of the forest growth.

REFORESTATION.

Both through seeding and through the planting of young stock grown in the National Forest nurseries the work of reforestation was pushed. Under the plans which I have approved an average of 30,000 acres will be covered each year, the amount varying, however, to fit such special conditions as may present themselves. In years of unusually heavy seed crops, for example, the seed gathering will be put ahead of the sowing and planting work. About 20,000 acres was covered last year, of which about 14,000 acres was sown and 6,000 acres planted at a total cost of about $130,000. Work on a large scale is now centered in the regions where climatic conditions are most favorable. Elsewhere the work is primarily experimental—to discover the methods which will permit the difficult work to be accomplished most successfully and at least cost. Facilities for gathering the seed needed for direct sowing and in the nurseries were increased and the cost of seed extraction was markedly cheapened. Nearly 50,000 pounds of clean seed were collected, at an average cost of $1.68 per pound. It was established that the best results are secured when seed from the region in which the trees are to be grown is used.

PROGRESS IN RANGE MANAGEMENT.

With a somewhat smaller area under grazing administration than in 1911, the number of animals grazing under permit was very materially increased. This is mainly the result of the improvement in range conditions which regulated grazing has brought about. Not only the range but also forest growths and waterflows have been benefited. Efforts were continued to bring into use range hitherto unutilized because inaccessible. In northeastern Washington, northern Idaho, and northwestern Montana, especially, much forage is now going to waste which better shipping facilities will make it possible to utilize; negotiations which have been undertaken with the railroads promise a favorable solution of this problem. Through the construction of improvements for the control of the movements of stock and to make water available for them, through continued study of the forage resource and of the modifications which it undergoes in the different forms of use, through determination of the kind of stock to which each part of the range is best adapted and adjusting use accordingly, and through stock protection against losses by contagious diseases, poisonous plants, and the depredations of wild animals, the work of past years was continued and extended.

Range management aims at maximum forage production, improved methods of utilizing the forage resource, and development of the stock industry along the lines most beneficial to the community. To secure from the range its largest economic returns to the stock industry in profits and to the country in meat supplies, wool, and hides, intensive methods of range utilization must be devised and adopted. Much of the foundation work for the development of such methods has now been done. With diminution both of the extent and of the carrying power of the open range, the problem of producing the beef and mutton which an increasing population must have has become serious. There is a growing tendency to remove stock from the unreserved lands to the forest ranges. The advance of settlement and the rapid appropriation of the choicest lands and of areas which control large tracts of grazing land by individual stockmen is both diminishing the opportunity for new men to enter the stock business, and tending toward a situation in which the public will have to pay not only for the cost of production on the open range, but also for the charge which represents rising rental value. It is of no small consequence that so large a part of the range is in public control and may be used in the ways which will result in the greatest benefit to all the people.

ACQUISITION OF LANDS UNDER THE WEEKS LAW.

The work of examining lands for purchase by the National Forest Reservation Commission under the Weeks law was actively carried forward. During the year 665,000 acres were so examined, which, together with 175,000 acres examined in the fiscal year 1911, brings the total area thus far covered up to 840,000 acres. The total area in process of acquisition by purchase or condemnation at the close of the year was not quite 260,000 acres, situated in New Hampshire, Virginia, Tennessee, North Carolina, and Georgia. To prevent speculation in options it became necessary to announce during the year that no optioned lands would be considered for purchase. In order to secure title satisfactory to the United States it has proved necessary in many cases to resort to condemnation proceedings. Of the lands placed under purchase contract or condemnation proceedings during the year, part are cut over, part are more or less heavily culled, and part are virgin timberland. The prices paid ranged from $1.15 to $15 per acre, with an average of $5.95.

STATE AND PRIVATE COOPERATION.

The first place in cooperative work with States is that provided for by the appropriation of $200,000 carried by section 2 of the Weeks law, the aim of which is to secure the protection from fire of the watersheds of navigable streams. Cooperative agreements entered into with 12 States have resulted in the protection, wholly or in part, of such watersheds as the Penobscot, Kennebec, Connecticut, Merrimac, Hudson, Delaware, and Potomac in the Northeast, the Mississippi in Wisconsin and Minnesota, and the Columbia and Willamette in the Pacific Northwest. As a result of the law very great progress has been made by many States, particularly in the East, in the development of organized fire protection. There is great need for more work of this kind in the South, but few of the States there have as yet passed laws which make it possible, under the conditions which I have felt it necessary to prescribe, to enter into cooperative agreements with them. One very striking effect of the law has been to stimulate the proper care of forest resources wherever its provisions have been applied. On the average every dollar expended by the Federal Government has resulted in the expenditure of at least $2 by the State and private owner, and I look for this ratio to increase as the benefits of protection become clearly apparent. The sum appropriated will be exhausted by the year 1914. A further appropriation to permit this work to be continued and extended into new States is, in my judgment, highly desirable.

FOREST INVESTIGATIONS.

Experimental studies conducted on the National Forests, in addition to those having to do with reforestation, yielded results which will be of the greatest usefulness in arriving at the best methods of management and protection, and in determining forest influences, the characteristics of different forest types, and the growth, volume, and yield of important tree species. The utility of these studies is, in fact, twofold; for they not only furnish the necessary scientific basis for National Forest management, but also supply knowledge indispensable for the application of forestry to private timberlands throughout the West. The principal agency for conducting such investigations is the experiment headquarters which have been established on Forests affording conditions typical of a wide region, though the work is supplemented by field studies conducted in many different localities. Two new stations were established during the year. Though none of the stations has been established more than a few years, the results already secured have been of the greatest assistance in the actual work of forest management. Leading in the work of the past year were studies of the best silvicultural systems and degrees of cutting to secure natural reproduction; the effect of forest cover on streamflow, excessive wind movement, and evaporation; the damage caused by light surface fires; the deterioration of fire-killed timber; and the growth, yield, utilization, and life history of five important western trees.

Besides the investigations conducted on the National Forests, silvicultural and other studies were carried on to obtain information applicable to the best management of woodlands in all parts of the country. Aside from their use in the particular study for which they are gathered, the data and measurements collected in the course of silvicultural studies, taken together, furnish a basis upon which it is possible to establish laws and relationships of tree growth of the greatest value to those having to do with the study or management of timberlands. Dendrological investigations included studies of the distinguishing structural characteristics of important native trees and of foreign woods for which inferior substitutes are likely to be placed upon the American market.

Studies of forest products, centered mainly at the Forest Products Laboratory at Madison, Wis., yielded important results. These, by increasing our knowledge of the saving which can be effected by the preservation of wood against decay, by indicating the possibility of utilizing for different purposes supposedly inferior but abundant species in the place of more valuable ones now becoming scarce, and by showing how greater efficiency can be had in methods of manufacture, promote forest conservation in a very important field. Studies in wood preservation have dealt with the efficiency of various preservatives, the penetrability and resistance to decay of different woods, and the best methods of injection. Wood turpentines have been studied and analyzed to arrive at the best methods of distillation and refining and to determine how their composition is influenced by different methods of production. Woods heretofore utilized little or not at all in the manufacture of paper have been tried and found suitable for certain grades. Strength tests have been made on many species of American woods. Different methods of kiln-drying lumber have been studied, and a new and more efficient type of kiln designed.

BUREAU OF SOILS.

PROGRESS OF THE SOIL SURVEY.

The work of this bureau has been vigorously prosecuted during the last year. The soil-survey work has been carried on in 80 areas, distributed through 28 States.

There have been surveyed during the year 31,304 square miles, or 20,034,560 acres, on the detail scale of 1 mile to the inch, and 149,810 square miles, or 95,878,400 acres, on the reconnoissance scale of 4 miles to the inch. The reconnoissance work has been mainly in the Great Plains region.

More and more active interest is being taken in the soil survey, and a number of the States, in addition to those which were reported last year, have started active cooperation work with the bureau, in order that the progress of the survey within their borders may be hastened for the benefit of their people.

The soil-survey work as a whole has progressed to such an extent that a very fair idea can now be drawn of the soil resources of the country, and the results are being used extensively as the basis for other lines of agricultural investigation and for the development of agricultural possibilities and resources.

During the year a revision of all the work completed to January 1, 1912, has been made. The material is at hand for a comprehensive bulletin on the soils of the United States, showing the methods used in the soil survey, the basis of the classification of the soils, and the use to which each of the soil types is best adapted.

At the same time active work is being prosecuted in the further study of some of the individual soil types and soil series that are of great national importance and in the preparation of reports giving a comprehensive view of the uses to which they are now put, and suggesting their best use in different parts of the country and under different climatic and industrial conditions. A bulletin describing the Norfolk series has already been prepared, covering the whole question of the best use of these several soils in the important special line of truck farming. A similar bulletin on the Clyde soils, typically developed around the Great Lakes, is in progress, and some preliminary work has been done on some of the other important soil series.

The reconnoissance surveys have been extended in the Great Plains, until now soil maps have been published or are in course of publication of the western half of two-thirds of North Dakota, South Dakota, Nebraska, Kansas, the Panhandle of Texas, and a large area in south Texas, giving an almost continuous strip from Canada to Mexico.

While these maps are on a scale of 4 miles to the inch, it is believed that for many years to come they will serve the purpose of aiding in the agricultural development in this sparsely settled region, where the soils are uniform over large areas and where for this reason greater detail of mapping is not absolutely essential.

Several of the most experienced men in the soil-survey work have been detailed to assist the Bureau of Forestry in the examination of the soils of the National Forests and to pass upon their agricultural value for the information and guidance of the Forest Service in carrying out the law regarding the elimination of agricultural lands from forest reserves. As this work must develop to large proportions in the immediate future, I have included in my estimates an increase of $20,000 for the Bureau of Soils. Only in this way may the bureau meet the increasing demands that will result from the requirements of the last appropriation act for this department.

SOIL CHEMISTRY.

Work has continued during the year on the fundamental and thorough investigation of the composition of important soil types, determining both the mineral components of the soil and all of the elements, including the rare elements that have heretofore been overlooked in the chemical analysis of soils, for the purpose of throwing more light than has heretofore been shed upon fundamental differences or similarities between the mineral parts of soils

SOIL PHYSICS.

The physical properties of soils have long been recognized as exceedingly important in the distribution of crops and in the development of agriculture.

The relative amount of sand, silt, and clay and the way these are combined or held together has an important influence on the drainage and aeration and on the mechanical work of cultivation, and with the organic content of soils has a very important influence on the retentive power of the soil for moisture and the supply of moisture available for crops. The extent to which these physical properties can be influenced by cultivation, fertilization, and by crops themselves is being investigated as a basis for improved and efficient methods of maintaining the soil in suitable physical condition for those proper functions that are adapted to the needs of our staple or special crops.

FERTILIZER INVESTIGATIONS.

The investigations along this line have shown that the United States contains ample raw materials for the production of all the standard fertilizing materials that it now demands.

The groves of giant kelp along the Pacific coast of Mexico, the United States, and Alaska have been found to contain a vast supply of potash salts which can be recovered for agricultural use; and if these kelps are properly protected and the plants are allowed to grow and function normally, the segregation of potash salts from the sea water continues and, by harvesting from time to time, a continual supply of potash can be maintained.

The mechanical difficulties in the cutting and harvesting of the material are now being taken up by commercial firms in a way that makes it seem probable that adequate methods may be devised to utilize this source for the production of sufficient potash for the country's needs.

In the meantime, an unremitting search has been maintained for possible surface deposits of potash salts in some of the desert basins. Theoretically, it seems probable that areas may be discovered where segregation of these salts has occurred, and one such deposit, rich in potash, is now actually being exploited commercially. This is especially important since the examinations that have been made of our salt brines seem to show that there is little prospect of success along this line.

The enormous deposits of phosphate rock in this country have a tendency to induce waste and undue exploitation of high-grade rock only. From investigations now well advanced, however, it appears that at no distant time the utilization of low-grade rock may be looked for on a commercial scale.

The investigations into the possible sources of suppry of nitrogen have been sufficient to indicate that if future developments make it necessary the United States can supply its requirements of this expensive material.

SOIL-WATER INVESTIGATIONS.

In my first report to the President, made nearly 16 years ago, I called attention to the fact that rainfall was of little benefit to crops until it had entered the soil, and from there on the benefit was proportional to the ability of the soil to retard and regulate its flow toward the sea. The whole question, therefore, of the utilization of the rainfall in agriculture depends first upon the amount of water which enters the soil and next upon its movement within the soil.

During the last year a very exhaustive study has been made of the depth of free-flowing ground water under the surface of the soil in all parts of the United States, and somewhat as to the movement of this ground water, which has been found in some instances to extend over hundreds of miles between the source of supply and the discharge into the sea.

Having determined the fundamental position of the free water in the soil, it remains to study more intensively than has been possible heretofore the distribution of the water between the ground water and the surface of the land, as well as the effect of cultural methods in properly regulating the supply available for crops. It is believed that methods are now available by which this important but very intricate problem can be worked out.

SOIL-FERTILITY INVESTIGATIONS.

Thirty-five to forty definite organic chemical compounds have been separated from the humus portion of the soil, and a number of these were discovered in the last year.

Sufficient is known of the subject now to indicate that the soil has certain functional activities and that organic matter is digested in the soil, through the agencies of bacteria, enzyms, fungi, insects, and more purely chemical agencies in a manner similar to the processes of digestion in living organisms. The presence of certain organic bodies in the soil indicates that the functional activities of the soil are proceeding in such a way as to make the conditions beneficial or harmful for any particular plant or crop.

It has been found, furthermore, that through methods of cultivation, of fertilization, and of crop rotation the functional activities of the soil may be controlled within limits so as to put the soil in better condition for crops than it formerly was, or to maintain it in such conditions of functional activity as to exact from the soil a larger crop and a better condition in the soil for succeeding crops.

The problem of soil fertility is thus shown to be exceedingly complex, but its very complexity makes it appear hopeful that we will ultimately reach the understanding of the subject that will enable us to handle intelligently all our important soil types and so to understand their peculiarities and their particular needs as to enable the most rapid progress in the development of more intensive methods of agriculture than now prevail.

BUREAU OF ENTOMOLOGY.

Without increased appropriations by Congress, the work of this bureau has been carried on during the year along much the same lines as indicated in previous reports, and with a continually increased benefit to the agricultural interests of the country. While its efforts have been directed mainly to the search for the best methods to control the insect enemies of agriculture and horticulture, the subject of the damage to the health of live stock and to the health of man himself by the carriage of disease by insects and the subject of the insect injuries to forests have been included in the work of the bureau.

THE GIPSY MOTH AND THE BROWN-TAIL MOTH.

There was during the year comparatively slight increase in the territory infested by gipsy and brown-tail moths. The work of attempting to prevent the further spread has been continued in the way of clearing up roadsides, in the way of the inspection of all plants and plant products going out of the infested territory, by the study of the diseases of the gipsy moth, and by the continued importation and establishment of parasites and natural enemies of both species from abroad. Conditions within the infested territory continue to improve, and neither the gipsy moth nor the brown-tail moth is any longer the pest in the villages and towns of New England that it was even five years ago. In the woodlands the damage produced especially by the gipsy moth is still evident, but great progress has been made in the study of woodland conditions, and this study has apparently arrived at the point where the preservation of the forest areas in New England seems to be a decided possibility, even in the presence of the gipsy moth, and this may be brought about by a varied system of forest management, the details of which are being prepared for publication and general distribution. But one new isolated outbreak of the gipsy moth of any size was discovered during the year, and this was found at Geneva, N. Y. The State authorities, aided by the advice of the experts of the bureau, have apparently radically exterminated the insect at this point, so that there is no fear of future spread from this portion of central New York.

THE ALFALFA WEEVIL.

Active work against the alfalfa weevil, which threatens widespread destruction, has been carried on with the help of added funds appropriated by Congress. More men have been added to the field force, and the insect has been carefully followed through the entire year. Not only has this work been carried on in the laboratory and in the fields adjoining the headquarters, which are at Murray, Utah, but it has been duplicated to a large extent in higher altitudes in order to obtain thorough knowledge of the insect throughout the territory over which it has become distributed. Experimental work with parasitic insects and parasitic fungi has been carried on, and several species of parasites have been imported from Europe, which is the original home of this weevil. Field experiments looking toward the combining of alfalfa with other crops, in order to reduce the intensity of the weevil attack, have been carried on in cooperation with the Bureau of Plant Industry, and mechanical field experiments have been made upon a large scale. It seems now that the second and third crops of alfalfa can be grown successfully, even in the presence of the weevil, by adopting measures discovered in the course of this work, but, as the important crop is the first crop, more work remains to be done in the hope of discovering methods of obviating or greatly reducing the attack of the weevil in the early portion of the year. The insect does not seem to have spread as rapidly as was feared, but it is likely to turn up at almost any point where alfalfa is extensively grown.

WORK AGAINST FOREST INSECTS.

It is a pleasure to announce, in connection with the work against forest insects, that while a year ago great damage was threatened by the southern pine beetle in the States of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas, the efforts made by the bureau resulted in such good work on the part of timber owners that the danger mark may be said to have been already passed for the present and that the enormous prospective damage has been prevented. In the course of this work there was one notable example of successful control at direct expense. In a 90,000-acre tract, where there was thousands of dollars' worth of beetle-killed timber and every indication that the damage would be even greater this past year, $373 were spent in the cutting and burning of 60 infested patches, with the result that in the spring of 1912 it was found that the spread of the insect had been practically checked and that almost no pine was being attacked.

Work of this same character has been carried on at a number of points in the West by cooperation with the State authorities, with the Forest Service of this department, and with private owners, and it has been demonstrated again and again not only that much of the loss of insect-killed timber in past years might have been prevented without any extra expenditure of funds, but also that with care and foresight in the future the work of the destructive bark beetles over nearly all of our territory can be economically controlled.

INSPECTION WORK.

I called attention in my last two annual reports to the urgent need of the passage by Congress of a plant quarantine and inspection law, showing as forcibly as possible that the United States has been the only great power without a law to protect it from insect pests and plant diseases from other countries with which it has commercial relations. Down to the close of the past fiscal year, although legislation was pending in Congress, no action had been taken, and with a view to securing as perfect inspection as possible in the countries of origin of nursery stock especially, which was bound to be imported in large quantities the coming autumn into this country from portions of Europe, the chief of the bureau was sent abroad to confer with the nurserymen and the inspection officials of those countries. Toward the close of the session of Congress within the present fiscal year, an inspection and quarantine bill was passed by Congress and a Federal Horticultural Board was established, composed of members of the Bureau of Entomology, of the Bureau of Plant Industry, and of the Forest Service. Regulations have been drawn up by this board covering the importation of products likely to carry injurious insects and disease, and certain quarantines against certain classes of products have been announced. This is a great step in advance, and it is hoped and expected that the operations of the act will serve as a marked protection against the introduction of injurious species into this country in the future. When we consider that more than one-half of the pests of this kind of first-class importance existing in this country have been in past years introduced in this way and unwittingly established in our midst, with the resultant damage of millions of dollars' worth of property, the country can at last congratulate itself upon the fact that it is in position to prevent very great prospective waste.

Inasmuch as special mention was made in a previous report of the destruction by experts of this bureau, after inspection, of a large shipment of ornamental flowering cherry trees sent as a gift from the city of Tokyo to the wife of the President, it is a pleasure to announce that among the importations of the past year which have been inspected here in Washington there was another shipment of 3,000 ornamental flowering cherry trees sent by the city of Tokyo to replace the former shipment, and that after inspection these trees were found to be free from injurious insects, although examined individually with great care. They have been planted in the District of Columbia.

WORK ON INSECTS AFFECTING THE HEALTH OF MAN.

The investigation carried on by the Bureau of Entomology on the Rocky Mountain fever tick was completed during the year and the results published. The investigation showed that the proper treatment of certain domestic animals will probably result in the practical extermination of this disease in the infected regions.

A very interesting investigation has been begun concerning the possible relations of biting insects to the carriage of pellagra. These investigations have been carried on for the most part in the State of South Carolina in cooperation with the Postgraduate Medical School of New York City. It is well known that claims have been made by an English investigator, Sambon, working in Italy, to the effect that pellagra in that country is probably carried by the bite of a gnat of the genus *Simulium* flying from patients affected by the disease to healthy persons. The investigations which have been carried on in South Carolina, however, seem to indicate that, in this country at least, if pellagra should be shown to be carried by any biting insect, the insect concerned in this transmission in South Carolina is very much more probably the biting stable fly or biting house fly (*Stomoxys calcitrans*) than any of the resident species of the genus *Simulium*. This conclusion is especially significant in view of the recent announcement by the experts of the Harvard Medical College that they have secured experimental proof of the transfer of infantile paralysis by this same species.

WORK ON THE WHITE FLY IN FLORIDA AND ON OTHER ORANGE INSECTS.

The investigation of the white fly in Florida has made substantial progress and is nearing completion. The parasites imported from India have apparently died and have not become established in Florida, but inexpensive and effective methods of spraying have been found and are now being used and promise to settle in a satisfactory manner the problem of direct control. Demonstration work is now going on.

Work on the orange thrips being carried on in California has resulted in the finding of satisfactory spraying methods, and, after demonstration on a large scale, these methods have been adopted by the orange growers.

Further investigations have been begun with a view of still further cheapening the hydrocyanic-acid gas process for the fumigation of orange trees against scale insects in southern California. The results previously announced have brought about enormous economy in these methods, and work going on at the present time promises to cheapen them still further to a degree which will result in very great benefit to the growers.

OTHER WORK.

The Mexican cotton boll weevil has continued to spread somewhat, and has reached western Florida. Owing to the early cold weather of the autumn of 1911, certain territory in the northern range of this species was at least temporarily rid of the pest, the early freeze catching them in the larval condition. Work on the testing of control measures has been carried on in the Mississippi Yazoo delta, and the study of the parasites of the species has been continued, while attempts have been made to locally concentrate parasites from one region into another.

Work upon tobacco insects and the insects affecting sugar cane has been continued. An extensive experiment has been carried on in New Orleans in the effort to eradicate totally the sugar-cane borer which bids fair to be successful in this locality.

The Argentine ant has been shown to be most injurious to orange plantations in Louisiana and now threatens to spread to the orange groves of Florida. Measures of control so far ascertained have been reasonably successful, but it is difficult to secure their general adoption.

The work on the cotton red spider in South Carolina has indicated the food plants upon which this creature passes the winter, and a spray of potassium sulphide in water has been shown to be an economical and effective method of destroying the spider when it has invaded a field. Work with this solution can be successfully carried on at an expense of 75 cents per acre.

Large-scale spraying operations against the pear thrips have been carried on as demonstrations in California. Nearly 15,000 acres of orchards have been sprayed under the direct supervision of the bureau and with excellent results.

Field work against the onion thrips has been continued in Texas and Indiana. Good control measures have been discovered against this insect, and with widespread cooperation it is believed that the damage which it does may be largely stopped.

THE MEDITERRANEAN FRUIT FLY.

The appearance in destructive numbers of the so-called Mediterranean fruit fly in the Hawaiian Islands attracted much attention, especially from the State of California, since it was feared that the introduction of this pest from Hawaii into the port of San Francisco would result in serious damage to the fruit crops of the Pacific coast. Funds would not permit of active operations on the part of the department against this pest prior to the close of the fiscal year, but preliminary studies were made in anticipation of an appropriation by Congress, which was granted toward the close of the session in August. The results of the work done under this appropriation will be reported next year, but it should be stated at this time that experts have been sent to Hawaii and that all aspects of the threatened danger which seemed to afford a profitable field for investigation are now being carefully studied by competent men, while, with the coperation of the Territorial government and of the State of California, actual exterminative work in the region of Honolulu is being carried on as far as possible.

BUREAU OF BIOLOGICAL SURVEY.

REARING FUR BEARERS.

There are extensive regions in the United States well adapted to fox farming and kindred industries, and the rearing of fur-bearing animals for their pelts continues to be a subject of much interest, as is shown by the many inquiries from various parts of the country asking for information on the subject. Skunks, muskrats, mink, and foxes are reared in captivity or on preserves under control of breeders. The great demand for breeding animals and the reluctance with which successful breeders part with their stock of black foxes have caused large prices to be asked for mature animals, preventing the business from becoming general, and confining the industry in the hands of a very few.

Comparatively few attempts to raise mink have been made in the United States, and but little is known on the subject. But at from $3 to $8 for first-class pelts, the present prices, which are not likely to diminish, the raising of these animals should be remunerative, especially in connection with some other established business, such as poultry raising, orcharding, or truck growing; therefore, in cooperation with the National Zoological Park, steps have been taken to experiment with these animals with a view to determining the most successful methods of rearing them.

Muskrat farming is already a prosperous business, and has probably reached its highest point of development on the Eastern Shore of Maryland, although followed in other sections of the country. Muskrat marshes are worth more, measured by the actual income from them, than cultivated farms of like acreage in the same vicinity. The marshes need only to be protected from poaching, as the muskrats feed on the roots of the reeds and marsh grass, and the rental to the trappers is usually for half the fur, leaving the meat as an additional source of gain to them. Only one other animal in the world, the European rabbit, exceeds the muskrat in the number of skins marketed.

RODENTS IN RELATION TO AGRICULTURE.

Prairie dogs, ground squirrels, and gophers are very destructive rodents, inflicting large damage and levying a heavy tax upon the tillers of the soil; therefore the Biological Survey conducts experiments with poison baits, traps, and other methods of extermination.

The daily forage consumed by 32 adult prairie dogs equals the amount required by a sheep, and 250 eat approximately as much as a cow. The ground squirrel, though smaller, is a voracious feeder, and the gophers, comparatively small, are not abstemious. As the region infested by these pests includes a number of Rocky Mountain States, California, and other Western States, and as some of the colonies occupy many thousand acres and aggregate millions of rodents, the extent of the damage they do to forage and other farm crops can be readily comprehended.

Besides, it has been definitely ascertained by the investigations of the past two years that the spotted-fever ticks, in the two younger stages, live almost wholly on small native rodents, and that the California ground squirrel has been infected with bubonic plague by fleas from rats, hence that these dread diseases are likely to become endemic. Therefore there are two important reasons for attempting the extermination of the animals. The chief reliance for this is placed on the use of poisoned grain and other poisoned baits, but the use of traps, and, in some cases, the use of carbon bisulphid or pintsch oil in the burrows, supplements the poison. In these experiments oats have been found to be the best vehicle for carrying poison, as it is readily eaten by the rodents and rarely by birds.

THE ECONOMIC RELATIONS OF BIRDS TO FARMING.

Investigations by the bureau, in cooperation with the Bureau of Entomology, as to the relations of birds to the insect to determine what aid, if any, birds are likely to lend in checking the increase of the alfalfa weevil and retarding its spread, show that although the weevil has been established in this country only five or six years 31 species of birds have already learned to eat it. It is an interesting discovery that the English sparrow heads the list as a determined foe of the weevil, and that, if it is possible to utilize the services of the English sparrow against the formidable insect foe, the alfalfa weevil, it will be part compensation for the damage done by that bird in other sections.

Birds also prey upon the boll weevil while it is hibernating, while on the cotton plants, and during its autumnal migration flights—the period when the weevil chiefly extends its range.

The Biological Survey, by making a careful analysis of the stomach contents of different species of birds, can show their relation to agriculture and horticulture, whether beneficial or injurious, and approximate the good or harm they do. The importance of this work is very great.

A Farmers' Bulletin entitled "Some Common Birds in Relation to Agriculture," which was issued many years ago, has always been in great demand, and over 500,000 copies have been distributed. In order to furnish additional literature along the same lines, two other Farmers' Bulletins on familiar species of birds have been prepared, one dealing with some common game, aquatic, and rapacious birds in relation to man, and the other treating of the common birds of forest, field, and garden.

IMPORTATIONS.

In addition to studies of native birds with the view of aiding the farmer, supervision of the importation of birds and animals in order to prevent the introduction of species which might prove injurious is by law maintained by the bureau, and 583 permits were issued and 140 consignments inspected by the regular inspectors of the Biological Survey stationed at New York, Philadelphia, and San Francisco, as compared with 519 permits and 123 inspections in 1911. Under these permits there have been imported 428,269 birds and 4,582 mammals. Of these birds there were 338,275 canaries, 15,409 pheasants, 23,181 partridges, 11,353 miscellaneous game birds, and 40,051 miscellaneous nongame birds. Besides these, 28,808 birds and 875 mammals requiring no permits were admitted to entry, making a total of 457,077 birds (including 362,604 canaries, 15,412 pheasants, 23,181 partridges, 11,493 miscellaneous game birds, 44,387 nongame birds) and 5,457 mammals. Fifty-five permits were issued at Honolulu covering the entry of 123 birds, 17 mammals, and 10 reptiles.

Among the birds were 23,181 European partridges, as compared with 36,507 in 1911. This bird has not proved as popular as it did several years ago, and has been purchased in smaller numbers by State commissions and private individuals. The importation of quail from Mexico reached 7,570, as compared with 3,110 in 1911 and 1,246 in 1910. This number might have been much larger but for the suspension in the issue of permits early in February, owing to an outbreak of the highly infectious quail disease in the Southwest and the practical cessation of all interstate shipments of quail after that date. Among the rarer waterfowl were some 250 Formosan teal. These birds were first imported into the United States in 1909, but the number brought in during the past fiscal year considerably exceeds that of preceding years. Interesting, also, was a shipment of 16 California Valley quail, imported from Austria. These birds, like wood ducks and other native species, have been sent abroad, where they are raised in captivity and are now being reimported.

Among the miscellaneous nongame birds was one Imperial Amazon parrot, imported from Dominica for the New York Zoological Park. This very rare parrot is almost extinct, and the specimen, which arrived on February 19, 1912, is apparently the first that has been imported alive into the United States. The shama thrush continues in popularity as a substitute for the mocking bird, as shown by the fact that more than 200 were brought in during the year. Rare birds imported for the first time included several East Indian species, most of which were consigned to the New York Zoological Park. Among the rarer mammals was a female gorilla, received by the park on September 23, 1911, which only lived until October 5. By far the larger number of mammals were guinea pigs and monkeys, imported for laboratory and pathological experiments. About half the squirrels imported are the European red squirrel, and the remainder are chiefly Mexican species. There were also about 1,300 white mice, intended chiefly for research purposes, a few silver and cross foxes, several beavers, and a number of ferrets. The foxes and beavers come from Canada, the former imported for breeding purposes, the latter for exhibition, while the ferrets are imported chiefly for killing rats.

No prohibited species, so far as known, have gained entry during the year. Under date of July 10, 1911, the director of the New York Zoological Park ordered the destruction of the female mongooses belonging to the park, leaving three males. One of the latter died in March, and on June 2, 1912, the other two were still on exhibition.

NATIONAL GAME AND BIRD RESERVATIONS.

It is not too strong an assertion to say that the antelope is in greater danger of extermination than any other kind of American big game, and that serious consideration and well-directed effort are necessary to prevent the species from becoming extinct in several States in which it was formerly abundant. The Yellowstone Park does not contain half as many antelope as it did four years ago, and not a national game refuge has been established in a region where antelope still remain, while attempts to stock certain bison ranges with those animals have not as yet met with success. There is great need for a suitable preserve, especially for antelope, in the antelope country. More effective protection seems to have been provided on private ranges in the Southwest than under either Federal or State auspices.

The work of caring for elk in Jackson Hole was continued during the winter in cooperation with the State authorities, and efforts will be made to place the winter feeding of elk at that point upon a more permanent basis by the acquisition of a refuge where hay can be produced and fed. It is estimated that 7,250 elk were fed last winter, but this is less than half of the 17,160 estimated to have wintered in that region. Adding these to the more than 30,000 which wintered in the northern part of Yellowstone Park, it shows that the great herds in the park and its vicinity number less than 50,000.

With the 10 calves born this spring, the buffalo on the National Bison Range have now increased to 81, or 44 more than the original number placed there three years ago. The beaver having disappeared from Mission Creek, arrangements have been made to procure fresh stock from the Yellowstone Park, and there are now several elk and some antelope on the range.

The national bird reservations number 56, including the Pribilof Reservation in charge of the Department of Commerce and Labor and the four new ones created during the year at Forrester Island and Hazy Islands, Alaska, Niobrara, Nebr., and Green Bay, Wis. For the better organization of the administration of these, four inspectors were appointed—one for the reservations in Oregon, one for the coast reservations in Washington, one for the mountain district, and one for the Florida reservations in the Gulf district. An additional warden was appointed for Clear Lake Reservation, Cal., and a special agent detailed to inspect the reservation at Bellefourche, S. Dak., Carlsbad, N. Mex., the southern reservations of Florida, and Forrester Island, Alaska. No species has ever been introduced on any of the bird reservations, with the exception of the European rabbit on Farallon Islands, Cal., and Laysan Island, Hawaii. In both cases they have increased so enormously that they have already become a serious pest, and efforts will be made to reduce them on Laysan Island. As in former years, permits have been issued to trap on two of the Oregon reservations, and 4,858 muskrats, 190 minks, 13 skunks, 11 weasels, 12 raccoons, 3 otters, and 21 coyotes were taken. The severe storms destroyed many nests, eggs, and young birds on the Passage, Key, and Pelican Island Reservations, but information received in the spring indicated that they had recovered from their losses.

Every effort has been made to stop the sale of plumage of certain birds, particularly herons, which in recent years have been slaughtered for the millinery trade. Laysan Island has recovered somewhat from the devastation wrought by plume hunters in 1910, but the colonies are still in a sadly reduced condition. Through the cooperation of the Revenue-Cutter Service, the *Thetis* visited the island twice during the year and reported everything in good condition.

Semiannual visits by cutters of this service will prevent molestation of the birds, as poaching will thus be made unprofitable.

GAME PROTECTION IN ALASKA.

At the close of the fiscal year new regulations were issued under the Alaska game law to afford additional protection to deer, prevent the excessive traffic in moose on the Kenai Peninsula, and to suspend deer hunting on five islands in southeastern Alaska, thus practically making them game refuges. The suspension of the sale of vension in 1911 has been continued through the season of 1912. Through cooperation of the Secretary of the Treasury, special instructions were given to the revenue cutters patroling Bering Sea to insure a strict enforcement of the law protecting walrus.

Under the appropriation of $15,000 for the protection of game, wardens appointed by the governor were stationed at several of the more important points. Sixteen permits were issued for the collection of specimens for scientific purposes or for exhibition.

INFORMATION CONCERNING GAME.

Through cooperation with the Forest Service, comprehensive data were collected for the first time regarding the number of big game animals killed on the various national forests, and as these forests include the principal hunting districts in the Western States the data thus collected furnish a practically complete basis for estimating the total number of big game killed in several of the Western States.

The index of game legislation has been almost completed. During the year the laws of Maine, Massachusetts, New Hampshire, Rhode Island, Connecticut, Pennsylvania, and most of those of New York were indexed. At the present time the only gaps in the index are a few years in New York, Maryland, and North Carolina. The work had advanced to a point early in the year which warranted the publication of a summary of some of the more important provisions under the title "Chronology and Index of American Game Protection from 1776 to 1911."

Data on the protection of migratory birds have been summarized, and likewise information brought down to date on the subjects of hunting licenses, National and State game preserves, bag limits, game commissions, and similar topics concerning which frequent requests for information are received. As in several previous years, data concerning the number and details of fatal hunting accidents were collected. These data show a regular increase in the number of fatalities in the United States from year to year, but it is believed that a certain proportion of these accidents can be obviated by special legislation.

The usual annual game publications were issued, including the "Directory of Game Officials," "Summary of the Game Laws for 1911," and posters showing the open seasons for game.

DIVISION OF ACCOUNTS AND DISBURSEMENTS.

During the year there were received, audited, and paid 129,584 accounts, amounting to $16,032,446.08. More than 5,000 of these accounts, moreover, were so-called combined accounts, in connection with which there was probably a saving of at least 25,000 checks, to say nothing of the saving of other clerical labor. There were also audited and sent to the Treasury for payment 6,241 accounts. In the payment of the 129,584 accounts mentioned above it was necessary to draw 212 requisitions on the Treasury and issue 241,544 checks. There were issued during the year 30,940 purchase orders for supplies, 6,683 letters of authorization for travel, 47,225 requests for passenger travel, and 11,105 requests for department bills of lading and requests on the Quartermaster General for the transportation of Government property, while about 187,600 letters were written or received in the ordinary transaction of business.

To carry on the work of the Department of Agriculture during the fiscal year ended June 30, 1912, Congress appropriated $16,900,016 for the ordinary expenses of the department, in addition to which permanent annual appropriations and special appropriations amounting to $6,190,826.15 were available, making a total of $23,090,842.15.

The disbursements of the department to June 30, 1912, pertaining to the fiscal year 1912 amounted to $17,772,993.80, and the greater part of the balance of $5,317,848.35 will be required for the settlement of outstanding liabilities.

The amount for rent of buildings in the District of Columbia for the several branches of the department was $71,804.75, and all accounts for the fiscal year 1910 having been settled, the unexpended balance of appropriations for that year, amounting to $344,760.56, was covered into the Treasury on June 30, 1912. The account for the fiscal year 1911 is still open.

The amount estimated for the fiscal year 1914 in the annual estimates for the regular appropriation bill is $18,287,230, which includes $1,440,000 for agricultural experiment stations, an increase of $1,635,734 over the appropriation bill for the fiscal year 1913. In addition to this, there will be available permanent annual appropriations amounting to $5,689,200, making a total of $23,976,430.

There is also an estimate in the sundry civil bill for printing and binding for this department amounting to $512,500, making a grant total of $24,488,930. The increase requested in the regular appropriation bill will be used principally in the extension of the activities of the department in connection with the eradication of tuberculosis among domestic animals, the eradication of cattle ticks, research work now under way on various dairy problems, the prevention of the introduction into the United States and the manufacture and sale therein of dangerous or worthless serums and viruses for use in the treatment of domestic animals, grain standardization and general cereal investigations, farm management investigations, farmers' cooperative demonstrations, the classification of agricultural lands, investigations in agricultural chemistry, the enforcement of the food and drugs act, meat inspection, the determination of sources of supply of nitrates and other fertilizer materials in the United States, soil survey, entomological and biological studies and investigations, farmers' institutes, irrigation investigations, investigations of systems of road management and best methods of road making and maintenance, field experiments with road-making materials, and the enforcement of the insecticide act and the plant quarantine act.

DIVISION OF PUBLICATIONS.

The results of the experiments, investigations, and activities of the department are made available for the information and guidance of the people by means of its publications.

By the most careful economy it was possible to issue 24,900,557 copies of 1,462 new pamphlets, containing 32,842 printed pages and 3,518 illustrations, and 9,778,000 copies of 648 reprinted documents, containing 23,179 pages and 3,977 illustrations. Therefore the total publications handled in this office amounted to 2,110 separate pamphlets, containing 56,021 pages and 7,499 illustrations, and aggregating 34,678,557 copies. Of these 20,998,557 were miscellaneous publications, 10,409,000 were Farmers' Bulletins, and 3,271,000 were lists of available Farmers' Bulletins. That so many new publications were issued and so great a number distributed is due to the economical and efficient supervision of the printing fund by the Division of Publications.

NO PUBLICATIONS WASTED.

The fact of greatest interest in connection with this large volume of publications is that they were all distributed to people who asked for them, and that many more could have been sent out if we had been able to fully supply the demand, which came from every section of the country. No one who applied has failed to receive at least some of the publications he wanted if they were available. It has been the policy to supply some publications to every applicant rather than a large number to a few persons, and with the exercise of discretion in the distribution of the publications none has been wasted.

On account of the great activity of the department's investigators and the unprecedented demand for published results, the appropriation for printing and binding was practically exhausted early in June, in consequence of which numerous publications containing accounts of the results of important investigations were delayed until July 1, to the great inconvenience of the department and the disappointment and loss of the public. An increase in the appropriation is necessary in order to enable the department to publish all the information acquired for the benefit of the people, as required by the organic act creating the department.

FARMERS' BULLETINS.

The demand for Farmers' Bulletins has never been so great. This is not surprising, since they are written in plain language and cover such a variety of subjects, among which are some sure to be of interest to everyone. Forty-four new bulletins of this series were issued during the year. It is now 23 years since the first Farmers' Bulletin was issued, and the unfailing popularity of these pamphlets has demonstrated the wisdom of their publication. In 1896 less than 2,000,000 met the demand, while in 1912 nearly 11,000,000 copies were issued, and many more were requested by correspondents, but could not be supplied. These bulletins are distributed jointly by the department and Members of the two Houses of Congress, four-fifths being placed at the disposal of Senators, Representatives, and Delegates. With the present appropriation it is possible to make an allotment of 12,500 copies to each, which is admittedly insufficient to supply the requests. With the increased membership of the Sixty-third Congress an increase of 10 per cent in the present appropriation of $125,000 will be required to allot this number to each Senator, Representative, and Delegate, and I have accordingly submitted an estimate for $137,500 for the printing of these publications. Of these publications 7,351,262 copies were distributed upon the orders of Senators and Representatives, being 1,877.183 more than during the last year.

SALE OF DEPARTMENT PUBLICATIONS.

The superintendent of documents of the Government Printing Office is authorized by law to sell Government publications, and, with the consent of the head of the department, to reprint such as may be needed to meet the demands when his supply is exhausted, defraying the cost out of his receipts for publications sold.

Last year he sold 171,866 copies of this department's publications, 120,450 of which were provided from reprints. The amount of these sales was $16,428.07. The larger number of the publications sold were from the technical and scientific series, and of course much the greater part of the receipts was from the sale of that class, but there was an increase in the number of popular pamphlets called for, showing the willingness of the unscientific reader of agricultural literature to pay the nominal price charged when the department's supply is exhausted.

LARGER EDITIONS OF 100-PAGE PUBLICATIONS.

In my last report reference was made to a provision of a bill revising the general printing law pending in Congress increasing the limit on editions of bulletins of the department from 1,000 to 2,500 copies. The bill is still pending, and it is earnestly hoped that this provision will be retained, in order that the department may distribute its more important publications, in many cases of high scientific value, more widely among the colleges, universities, and investigators in the scientific world, instead of being limited to Government institutions, and most of these only in this country. There are numerous other equally important provisions in the new printing bill which if enacted will enable this department to administer its appropriation more economically and efficiently and increase its usefulness to the people.

EDUCATIONAL USE OF OUR PUBLICATIONS.

The demand from the instructors and pupils in all grades of schools for agricultural literature is evidenced by the numerous requests, frequently for large numbers, received for department documents, which, owing to limited funds, it has not been possible to grant. Many of our publications are being used as textbooks, and it is believed that such use should be encouraged, even at the expense of an increase in the fund for printing.

SCIENTIFIC AND TECHNICAL PUBLICATIONS.

The publications of a scientific or technical character constitute about 35 per cent of those issued by the department, and while their distribution is naturally rather restricted, they constitute the permanent record of the achievements of our scientists, and many of them furnish the basis for the numerous popular bulletins and reports. They are of the greatest importance, and their prompt publication should always be insured. This has not always been possible with the available funds, and an increase in the appropriation has been requested and should receive favorable consideration. The issuance of a monthly or quarterly serial to which all bureaus, divisions, and offices could contribute would afford a convenient and permanent record for publishing many brief scientific papers which separately are too small to print, but which contain valuable results which should be published rather than preserved only in manuscripts, as at present.

ILLUSTRATIVE WORK.

Aside from the illustrations for publications, much of the work comprised diagrams, photographs, slides, etc., for the use of department experts in connection with lectures which they are called upon to deliver before agricultural organizations and societies in many parts of the country, showing the work of the department. This is one way of taking the department to the farmer.

The increasing use by the press of extracts from our publications is most gratifying, supplementing the wide distribution already given them by the department.

In every branch of the department's publication work, comprising editing, indexing, illustrating, and finally, the distribution of the publications, the results achieved exceeded those of any other year.

BUREAU OF STATISTICS.

The primary duty of the Bureau of Statistics is the preparation of monthly reports giving seasonable information concerning the acreage planted to the principal crops of the United States, their condition from month to month during the growing season, and their yield per acre, total yield, and quality; also the condition from month to month and relative production, expressed in percentages of full production of minor crops.

The number, value of farm animals, stocks of grains in the hands of farmers at specific dates, and the average prices received by farmers for leading products each month are reported; and a few other miscellaneous subjects, such as causes of crop damage, movement of crops, cost of transportation, farm wages, and the progress of spring plowing and planting, are dealt with.

SOURCES OF INFORMATION.

These reports are based on statements made by voluntary correspondents and salaried employees located throughout the agricultural sections of the country, in reply to inquiries prepared in the bureau and sent out from Washington embracing the subjects dealt with each month.

The voluntary correspondents are public-spirited citizens rendering service without compensation, and are excellent farmers, as careless or indifferent farmers will not take the pains to report month after month and year after year without money compensation; and some of these men have served the department 36 years. These voluntary correspondents, numbering about 130,000, consist of township correspondents, reporting for the townships in which they reside; county correspondents, reporting for the county in which they reside, from personal knowledge and upon two or more reports made by assistants living in other parts of the county; and special correspondents, supplying special information, such as crop yields, farm prices, cotton acreage and ginning, concerning grain in mills and elevators, the live stock on farms, and the tobacco industry.

The salaried reporters are State statistical agents, one residing in each State and rendering monthly reports to the bureau based on reports received by him from correspondents throughout the State and on his own personal knowledge and observation, and the special field agents assigned to duty in groups of States, performing travel throughout their territories, examining crops, interviewing farmers, country merchants, implement dealers, and others from whom dependable information can be obtained, and reporting each month to the bureau the conditions as ascertained by them.

COMPILING THE REPORTS.

The work of finally making the bureau's crop estimates each month culminates at sessions of a board whose personnel, with the exception of the chief of the bureau, who presides, and two regular members, is changed each month. The meetings are held behind locked doors, and all telephone or other communication is effectively prevented until the report is handed to the Secretary.

No other Government attempts to make so elaborate reports nor has so widespread or numerous crop correspondents. But the reports issued from month to month do not purport to be other than estimates; they are not the results of actual enumerations, as are the figures reported decennially by the Bureau of the Census. Every quantitative estimate of this bureau, whether relating to acreage and production of crops or numbers of live stock, is nothing more than a consensus of judgment of many thousands of correspondents and a limited number of agents.

The annual estimates regarding acreage of crops and numbers of live stock are based on corresponding estimates for each preceding year, there being no other bases to which can be applied the percentages of increase or decrease indicated by reports received from correspondents and agents, except once in 10 years, when census figures become available.

It is, of course, out of the question that an agricultural census be taken every year; the expense would be prohibitive. The only way in which the constant and increasing demand for information can be met is through carefully made estimates. It is not claimed that the estimates of the Bureau of Statistics are strictly accurate; no estimate can be. They are given as the best available data, representing the fullest information obtainable at the time they are made.

If the requirement that an agricultural census be taken hereafter every five years is carried into effect, the estimates of this bureau can be checked up and adjusted to the facts as disclosed by the quinquennial enumerations and new bases for estimates be provided every five years.

THE CROP REPORTER.

The Crop Reporter, of which 175,000 copies are printed each month, is sent to all who request it. It is circulated principally among farmers, including the bureau's voluntary correspondents, throughout the United States.

Among the subjects of interest considered in the Crop Reporter during the past fiscal year may be mentioned the following: "Interpretation of the crop-condition figures"; "Wheat movement from farms, monthly, 1910–11"; "Per capita imports and exports of agricultural products, by decades, since 1866"; "Monthly movement of grain"; "Sugar-beet production in United States, 1910"; "Durum wheat exports, 1910–11"; "Cost of producing barley"; "Bushels of weight and bushels of volume"; "Wheat prices in England, six centuries, chart"; "Cost of producing potatoes in United States, by grand divisions"; "Hop movement in United States, 1902–1911"; "Causes of crop damage, 1909–10"; "Stocks of potatoes, January 1, 1912"; "Seedtime and harvest"; "Quantity of wheat and oats sown per acre, by States"; "Wheat supply and distribution, by States"; "Wheat consumption per capita, by countries"; "Egg receipts at seven markets annually since 1891"; "Live-stock receipts at seven markets annually since 1900"; "Farm wages, 1911"; "Stock of wheat in interior mills and elevators"; "Length of service of crop correspondents"; "High prices and crop production"; "Apple shipments on important railroads"; "Index numbers of production per capita and prices of important farm products, 1866–1911"; "Testing of germinating quality of corn"; "Causes and extent of cotton damage"; "Railroads and agriculture."

DIVISION OF PRODUCTION AND DISTRIBUTION.

This division conducted an investigation during the last fiscal year concerning the economic results of cold storage and the relationship of cold storage to prices. The aggregate information obtained in this investigation constitutes, in variety and mass, much the largest body of facts concerning this business in its economic aspect that has been collected.

The latest comprehensive investigation of the wage rates of farm labor was completed during the past year, so that the department now has a record of averages of such wage rates for each State, for geographic divisions of States, and for the United States extending back to 1866. A simultaneous investigation was conducted with regard to the supply of such labor, and this constitutes the first comprehensive treatise that has been published on this subject.

The efforts of railroad companies to promote agriculture, especially by soliciting settlers to farm lands, by aiding in agricultural education, and by making other special efforts not strictly to be classed as transportation, were treated in a bulletin which went to press about the close of the fiscal year. The aim of this undertaking is to make practically a complete survey of the activities of the railroad companies in the promotion of agriculture.

In a bulletin published during the year are embraced the dates of planting and harvesting corn, winter wheat, spring wheat, fall-sown oats, spring-sown oats, barley, rye, buckwheat, flax, cotton, and tobacco. The collection and tabulation of materials for another bulletin relating to the forage crops was nearly completed. At the same time a third line of work, the dates of planting and harvesting vegetable crops, has been in hand.

A system was established for the collection of annual statistics of cane sugar and sugar-cane production in the United States and its insular possessions. Statistics of the campaign of 1911–12 for most of Louisiana and Texas and of the campaign of 1910–11 for Hawaii and Porto Rico had been obtained by the close of the fiscal year 1912.

An article was prepared for the Yearbook for 1911 on the reduction of waste in marketing fresh fruits and vegetables, as effected by improved methods of distribution and by better transportation facilities. The regular annual publications prepared in this division included the bulletin on exports of farm and forest products from the United States; the corresponding imports bulletin; a statement giving the shipments of apples on railroads of the United States for the crop of 1911, and another statement showing the exports of durum wheat. Monthly receipts of eggs and poultry at large cities were shown regularly in the Crop Reporter. The production and domestic supply of cotton, tobacco, rice, and hops in the United States, from the earliest available date to the latest, were shown in four circulars. These statistics were formerly included in the Yearbook.

DIVISION OF RESEARCH AND REFERENCE.

Ten circulars, each entitled " Foreign crops," have been prepared in the division at regular intervals during the year. In addition thereto. 2 bulletins, 7 circulars, 2 Yearbook separates, 12 monthly editions of the Crop Reporter, and 3 miscellaneous publications, all prepared in other branches of the bureau, have been read and revised in this division.

Four bulletins, entitled, respectively, "The world production, trade, and consumption of coffee," "Some statistical results of farm bookkeeping in Switzerland," "Land and labor," and "Comparative prices of staple products in leading markets of the United States," are now being prepared in the division and will probably be ready for publication during the next fiscal year.

THE PURCHASING POWER OF FARM PRODUCTS.

In 1910 an investigation was made in the Bureau of Statistics which showed that the money value of 1 acre of the farmer's crops in 1909 was 72.7 per cent more than the money value of 1 acre of his crops in 1899; that the average money value of the articles which a farmer buys was about 12.1 per cent higher in 1909 than in 1899; and consequently, as a result of the greater increase in price of what a farmer sells than in price of what he buys, the net increase in the purchasing power of the produce of 1 acre was 54 per cent; that is, the product of one acre in 1909 would exchange for 54 per cent larger quantity of the things farmers buy than the product of 1 acre in 1899. So much public interest has been evinced in this line of inquiry, bearing so closely upon the subject of the "cost of living," that it has been continued during the past two years.

Although the aggregate production of crops in 1911 was about 6.3 per cent smaller than in 1910 and 0.5 per cent smaller than in 1909, the total money value of crop production in 1911, by reason of enhancement in prices, was about 2.1 per cent greater than in 1910 and 3 per cent greater than in 1909. According to a report of the Bureau of the Census the value of all crops in the United States in 1909 was about $5,487,000,000; on this basis it is estimated that the money value of all crops in 1910 was about $5,537,000,000, and of crops in 1911, $5,654,000,000.

The money value of 1 acre of produce in 1911 averaged about $15.48, as compared with $15.50 in 1910, $15.99 in 1909, and $9.48 in 1899. The larger aggregate value of crops in 1911 than in 1910 and 1909 was due to increased acreage.

An investigation of prices of about 85 articles generally purchased by farmers indicates that such articles averaged in price in 1911 about 1.1 per cent higher than in 1910, 2.6 per cent higher than in 1909, and about 15.3 per cent higher than in 1899.

Taking into consideration the variation in the price of things which farmers buy and in the things which farmers sell, it appears that the purchasing power of 1 acre of crops in 1911 was 1.2 per cent less than in 1910, 5.7 per cent less than in 1909, and 41.6 per cent greater than in 1899.

Upon the basis of the purchasing power of the value of 1 acre of produce, the year 1909 stands as the most prosperous of recent years and apparently the most prosperous for farmers in the past 50 years for which there are records.

LIBRARY.

The growth of the library during the past year has exceeded that of any previous year. The total recorded number of books, pamphlets, and maps in the library on July 1, 1912, was 122,043. The total number of books and current numbers of periodicals borrowed from the main library and the libraries located in the bureaus and divisions exceeded 180,000. The number of books lent to libraries and scientists outside of the city of Washington was 620. The books borrowed from other libraries for the use of this department numbered 6,405, the majority of which were from the Library of Congress and the library of the Surgeon General's Office.

The total accessions for the year were 9,122, of which number 5,243 were received by gift and exchange. The large number of accessions by gift is especially gratifying, but it is a matter of regret that the funds available for the purchase of books and subscriptions did not permit of larger accessions by purchase.

As the national agricultural library, connected with the national institution for agricultural research, it has been the aim of this library to extend its services as far as possible to the investigators in agricultural science throughout the country. The land-grant colleges and experiment stations, though State institutions, are supplied in part by funds given by the National Government to the States to be used for their maintenance, and they have certain definite relations with the different branches of the National Government. Their relations with the Department of Agriculture are closer than with any other department of the Federal Government, and it is felt that they have, therefore, a just claim to a share in the services of the library of the department. This service the library has endeavored to render to the agricultural colleges and experiment stations through the printing of cards for department publications and for the accessions to the library, through the loan of its books, and by the distribution to them of its duplicates. It has also attempted in a limited way to supply bibliographical information in regard to the literature of agriculture.

OFFICE OF EXPERIMENT STATIONS.

RELATIONS WITH AGRICULTURAL EXPERIMENT STATIONS.

The progress of the experiment stations during the past year continued along the same general lines in which advancement was noted the year before. A general increase in equipment, growth in the various station activities, and organization on a more thorough and systematic basis was recorded, and in many instances the stations were benefited by greater financial assistance on the part of State legislatures and in a lesser degree from other sources.

The appropriations received by the stations as provided for by the acts of Congress amounted to $1,545,000 for the fiscal year ended June 30, 1912. Since the Adams fund has reached its maximum the Federal funds as determined by the Hatch and Adams Acts remain the same from year to year for all stations except those located in Alaska and the insular possessions, exclusive of the Philippines, for which Congress up to the present has made provision in the annual appropriations for this department. The work of the stations during the past year was aided by State appropriations to the extent of about $1,250,000, and the Federal and State funds were supplemented by fees, contributions, and amounts realized from the sale of farm products and other sources aggregating nearly a million dollars. The total of the funds at the disposal of the experiment stations for the year was approximately $3,767,000.

The policy previously pursued by this office in relation to the expenditure of the Hatch and Adams funds was maintained. The inspection of the past year's accounts showed in general a prompt satisfaction of station liabilities and an improvement in the system of accounting. The office has held that the expense of station accounting should be limited to only such a charge against the Hatch fund as is involved in the simple bookkeeping required by this department to show the expenditure of the Federal funds for each fiscal year. Efforts were continued to secure a larger amount of definite experimental work with the Hatch fund by relieving it from charges for administration, compiled publications, and demonstrations.

In accordance with the principle of using the Federal funds only for experimental and research work, the office has continued to emphasize and urge the need of systematizing the extension work and organizing it under a supervision other than that of the stations. The progress made in this direction is illustrated by the fact that already in more than 40 States extension work has been organized under the agricultural college, and extension directors, as special and separate officers, have been appointed and placed in charge of the work.

With regard to station publications, the department took the position that the issue of compiled bulletins of an entirely popular character, as already mentioned, can not be recognized as a proper charge against the Hatch fund, and that all stations should adopt a definite and regular policy in publishing the annual report as stipulated in the Hatch Act. Attention was also called to the importance and advisability of bringing out more conspicuously in the station publications, by a system of classification or otherwise, the results of research work on agricultural problems, and the belief was expressed that if the issuance of popular compiled bulletins, quite necessary in extension work, be left entirely to the extension departments, much ground would be gained in making the stations' contributions to agricultural science more accessible to the scientific world as well as to the general public.

Numerous lines of important work were pursued by the stations during the year. A brief mention of some of the results recently obtained will give a general idea of the scope and progress of this work.

The Colorado Station demonstrated the occurrence of apparently rapidly extending areas of soil in irrigated orchards and sugar-beet fields containing nitrates in such excessive amounts as to destroy the crops. This excess of nitrates is thought to be due to phenomenal bacterial activity.

The Missouri Station determined that nitrogen and phosphorus are the limiting elements of plant food in Missouri soils and that the majority of Missouri uplands respond to an application of these elements.

Analyses of drainage waters at the New York Cornell Station showed a loss of calcium of over 200 pounds per acre more on fallow than on soil growing corn and oats.

The North Dakota Station found that old land may be made as suitable for growing flaxseed as new land. From experiments and observations the conclusion was drawn that soil deterioration from a chemical standpoint in the principal flax and wheat regions is insufficient to account for the deteriorated yields in quantity and quality, and the deterioration along these lines is attributed to unsanitary soil conditions. The station has worked out specific rotations and methods of culture and seed treatment tending to reduce the activity of these soil troubles.

In studying the relation of soil bacteria to evaporation the Wisconsin Station found that bacterial activity in the soil may so change the nature of substances in solution in the soil water as to exert an influence upon evaporation.

Results secured at the Idaho Station showed a marked increase in protein content of several varieties of wheat grown on land cropped the previous year with potatoes, as compared with land in wheat the year before. Irrigation investigations at this station showed that wheat receiving from 18 to 20 inches of water during the season gave a yield of over 50 per cent above wheat receiving no water and above wheat receiving 50 inches during the same period of time.

The work in agronomy at the Kansas Station brought out quite clearly that the time and the method of seed-bed preparation for wheat very materially influenced the yield, especially in a dry season. Land disked but not plowed produced 4¼ bushels of wheat per acre, while land plowed at the right time, July 15, and at the right depth, 7 inches, gave a yield of 38⅓ bushels.

New varieties of timothy, originated at the New York Cornell Station, have shown strikingly superior qualities in drought resistance. The average yield for 17 new varieties in a dry season was 7,153 pounds per acre as compared with 4,091 pounds for seven check plats of ordinary timothy. Corn-breeding work with two different varieties resulted in each instance in a gain of about two weeks in earliness or time of maturing. Oat hybrids and selections made by the station and tested for five seasons have also shown marked improvement in yielding capacity as compared with common sorts.

The results of a study of the mineral nutrients in bluegrass by the Ohio Station indicated that some bluegrass pastures in the State contain percentages of the mineral nutrients twice as high as others and that these differences are due to differences in the soils upon which the grasses are grown. It was also found that the content of bluegrass in mineral nutrients may be very greatly increased by the use of fertilizers.

Work of the Utah Station has shown that Turkey Red wheat is the best yielding winter wheat of the State, and that the flour produced from it is of the best and equal in quality to any produced in other parts of the country. The work in dry farming conducted by the station on sagebrush land has shown the practicability of farming these lands under dry-farming methods, and as a consequence the greater portion of the sagebrush areas of the State have been taken up.

In its work on weed eradication, the Wisconsin Station found that a crop of hemp after cultivated summer fallow was very effective in killing out quackgrass and Canada thistle.

The plant-breeding and purebred-seed campaign initiated in most instances by the experiment stations is beginning to show notable results from more or less independent efforts. The Wisconsin Experiment Association, for instance, with a membership of about 2,000, is reported as selling annually $500,000 worth of purebred seed.

Working along the lines of animal nutrition, the Illinois Station discovered that within reasonable limits gain in weight in growing animals is not in proportion to the feed consumed, while the Missouri Station demonstrated that the practice of maintaining young heifers on a high plane of nutrition does not affect their milking quality, and that the size of the cow may be permanently increased by liberal feeding when young.

The Wisconsin Station observed that silage, as compared with soiling crops, can be fed with greater advantage to dairy cows during the summer season. The South Dakota Station, in testing the value of corn silage and roots for feeding steers, found that when these substances were fed with shelled corn and wild hay there was a larger gain than without these feeds, and that for fattening steers hay with silage proved to be better than hay or silage alone as a roughage.

In horticultural work, the results of orchard experiments by the Missouri Station showed that proper pruning alone on a given plat of peach trees resulted in a yield giving net returns of $125 per acre. Proper fertilizing with ammonium sulphate on another plat in the same orchard resulted in a yield of $40 per acre net, while on a plat where proper pruning, fertilizing, and spraying were all combined the peaches yielded a net profit at the rate of $300 per acre after paying the expenses of management and shipping the crop to market. A successful method of budding the walnut was worked out by the Oregon Station. This method is based on the principle of securing dormant 1-year-old buds, while propagators heretofore have attempted to use buds of the current year's growth.

The Delaware Station, in cooperation with this department, worked out a method for quickly immunizing against anthrax in case of an outbreak, and produced a serum with which it is possible to protect a sheep against an otherwise mortal dose of bacilli and to produce an immediate passive immunity.

In experiments to determine the efficiency of mitigated cultures of human tubercle bacilli as a vaccine against bovine tuberculosis, the Missouri Station found that vaccinated cattle contracted the disease when exposed to infected animals, even under the favorable conditions of an outdoor life. The fecal excretions of tuberculous cattle were a much more important source of infection to swine than foods contaminated with the saliva of tuberculous cattle. Not only a very large percentage of the pigs fed behind tuberculous cattle became infected with the disease, but some of the pigs showed well-developed tubercular lesions in less than four weeks of exposure. This station continued the manufacture of hog-cholera serum and distributed 60,000 doses during the year. In hog-cholera serum work the South Dakota Station showed that 90 per cent of all animals treated safely withstood disease.

The Ohio Station demonstrated the practicability of eradicating bovine tuberculosis and of building up a herd of sound animals from the progeny of tuberculous cattle by the systematic use of the tuberculin test and the thorough disinfection of barns.

In its studies of citrus diseases the Florida Station ascertained that the fungus causing stem-end rot is present in the orchard during practically the entire year, being found on partially decayed branches and twigs when the fruit is immature or after it is harvested.

The New York State Station worked out a method for the preparation of lime-sulphur wash enabling fruit growers to make their own preparations at a very considerable saving. Ten years of potato spraying with Bordeaux mixture at this station resulted in an average increase of 69 bushels per acre from three sprayings during the season, and an increase of 97½ bushels per acre from spraying every two weeks, or from five to seven times during the season. In a duplicate series of experiments on Long Island the average increase for the 10 seasons was 25 bushels per acre from three sprayings and 45¾ bushels from spraying every two weeks. In a similar way the results of 20 years' work with Bordeaux mixture on late potatoes at the Vermont Station showed an average yield per acre of 268 bushels for the sprayed and of 163 bushels for the unsprayed crops, representing a gain of 105 bushels per acre, or an increase of 64 per cent in favor of spraying.

In a study with a view to adapting the carbonation process of clarifying cane juices, the Louisiana Station discovered features in regard to temperature and alkalinity which enabled it to remove experimentally a much greater per cent of impurities than has heretofore been possible in sugar-house practice. This station also demonstrated that the fuel efficiency of bagasse can be materially increased by utilizing the flue gases in drying this product, and showed, further, how moisture contained in bagasse and other conditions influences its fuel value.

The results of breeding work with poultry at the Maine Station indicate that the female fowl does not transmit the heredity factors to her daughters, but that she may transmit the hereditary factor which makes for high egg production to her sons, and they can then stamp this quality on their female progeny.

We have reached the quarter centennial of the establishment of our national system of agricultural research institutions. Through this entire period the stations have been settling down toward their proper and ultimate research level. The gradual increase of the Adams fund to its maximum of $15,000 per year has led up to a degree of efficiency in research work which otherwise could not have been reached within the same length of time and with an equal financial outlay. However, before the coming of the Adams fund the stations solved many important practical problems and scientific questions. To enumerate ,these would be impractical, but as they are rounding out the first quarter century of station activity it might be well to mention at this time one of the first noteworthy achievements of their endeavor to combine science with practice in the development of our agricultural industry. Over 21 years ago the Babcock test was perfected at the Wisconsin Station, and at present is in use in its original form. The scientific principles on which it is based have not been supplanted, although the mechanical devices employed have been improved. This test made it possible to buy and sell milk on an equitable basis, and thus revolutionized the dairy business in the creamery as well as on the farm. If this practical and scientific method had been established by other than experiment-station effort it would have required large sums of money for royalties to satisfy the patent rights; but Dr. Babcock, with the noble conception of the disinterested scientific worker, gave it to the Nation and the world. With achievements of this kind to their credit the experiment stations can look back over their early history with pride and gain renewed zeal and encouragement for the future.

THE AGRICULTURAL COLLEGES AND SCHOOLS.

The faith of the people of the United States in agricultural education is becoming each year more apparent in the better support given to the agricultural colleges, in the establishment of additional agricultural courses in universities and colleges of private foundation, in the increasing number of States giving financial aid to secondary instruction in agriculture, in the attention given to the training of teachers of agriculture for secondary and elementary schools, in the large attendance of students at all sorts of colleges and schools in which agriculture is well taught, and in the great popularity of certain forms of elementary instruction in agriculture, such as children's gardens in cities, boys' corn clubs, girls' garden and canning clubs, and other juvenile agricultural club work.

According to a list published April 30, 1912, by the Office of Experiment Stations and compared with a similar list published in May, 1910, the number of land-grant colleges giving instruction in agriculture has increased from 57 to 61 and the number of privately endowed colleges from 24 to 42. Columbia University has established short courses and extension work in agriculture, and Syracuse University has added colleges of agriculture and forestry. Practically all of the State colleges for women in the South now maintain courses in agriculture, giving attention particularly to gardening, floriculture, and poultry husbandry.

Among secondary schools there are now 78 special agricultural schools, as compared with 58 in 1910, and 289 public high schools receiving State aid for courses in agriculture, whereas in 1910 there were 28. Minnesota alone is giving $125,000 a year to stimulate the introduction of agriculture, home economics, and farm mechanics into public high schools, 30 of these schools receiving $2,500 a year each and 50 schools receiving $1,000 each. Kansas, Louisiana, Maine, Maryland, Massachusetts, New York, North Carolina, Virginia, Texas, and Wisconsin are the other States that appropriate funds for this purpose.

Of public high schools teaching agriculture without State aid the number has increased from 432 in 1910 to over 1,600 in 1912, and of State and county normal schools which are giving their students some instruction in agriculture the number has increased from 156 to 196.

These are all institutions for white students. In addition, there are over 100 secondary schools for negroes, 16 special elementary schools for negroes, and 112 schools for Indians, all of which are giving some instruction in agriculture.

The total number of institutions listed in 1910 as having students in agriculture was 863, while at the present time there are 2,575, an increase of 1,712 institutions, or nearly 200 per cent, in two years.

FARMERS' INSTITUTES.

The work of the department in aid of farmers' institutes has continued under the direction of the Office of Experiment Stations. Reports received from the several States show that 5,663 regular institutes were held in 40 States. The total number of sessions was 15,965 with a total attendance of 2,272,146. It is estimated that complete reports from all States would show over 19,000 sessions of regular institutes with a total attendance of over 2,500,000. The reports in hand show that the special institutes aggregated an attendance of 1,389,266, making the entire attendance at institute meetings of all kinds nearly 4,000,000, an increase of over 360,000 over the figures for last year.

THE DEPARTMENT'S INSULAR AGRICULTURAL EXPERIMENT STATIONS.

The work of the experiment stations maintained by this department in Alaska, Hawaii, Porto Rico, and Guam during the fiscal year 1912 was very successful, and the results of their efforts in attempting the diversification of agriculture are beginning to be apparent. The practicability of farming on a considerable scale, gardening, small-fruit growing, and stock raising in Alaska has been fully demonstrated. In Hawaii and Porto Rico new industries are being developed and old ones revived, so that a much wider field of agricultural and horticultural activity is reported. In Guam the introduction of new crops has been eminently successful, and the restoration of agriculture to its former importance is believed to be assured. During the year some improved breeds of horses, cattle, hogs, and chickens were successfully introduced, and the upbuilding of the different classes of live stock has been begun.

The appreciation of the work of the several stations is growing rapidly. In nearly every instance the support of the Territorial officials is quite cordially given, and the stations are often taxed to their limits in supplying information, plants, etc., to the people for whom they are working. The published results of some of their scientific investigations are attracting attention and they are receiving wide publicity through scientific and review journals.

With the rapid development of their work the stations need additional buildings and funds for their support. The Hawaii Station needs a new laboratory building for its horticultural and agronomic work; the Porto Rico Station needs a plant laboratory where breeding, fertilizer, and other experiments can be carried on under controlled conditions; and a similar building is needed for the plant-breeding work in Alaska.

The popularizing of the stations' work through demonstration farms and other means is being rapidly extended, for the most part through funds contributed locally for this purpose.

ALASKA STATIONS.

The fall of 1911 was unusually prolonged, and as a result almost every variety of grain and vegetable planted at the several stations fully matured. Apples were ripened at Sitka, five varieties bearing fruit for the first time. The work of producing hybrid strawberries is being continued, and about 1 acre of land has been set to the best of the new hybrids. Other hybrid fruits have been produced and are under experiment to test their hardiness and quality.

The grain-breeding work at Rampart is being continued, and a number of new hybrid barleys of seemingly great promise are under observation. This breeding work will be continued and, as soon as possible, extended to include oats, to get varieties that have stronger straw to withstand winds and at the same time give larger yields of grain. Again it has been demonstrated that winter wheat suffers from the severe cold unless deeply covered with snow. The winter ryes came through much better and gave good yields. More attention will be given to growing winter rye as a staple crop. Plants of alfalfa obtained by Prof. N. E. Hansen in Siberia and northern Europe have been given a trial and have proved hardy for two winters at Rampart. These are being propagated as rapidly as possible to extend their use for forage and to increase the nitrogen of the soil, most Alaskan soils being deficient in this important element. At Fairbanks a very successful experiment in potato growing is reported. On 4 acres of newly broken land yields of 125 bushels per acre were obtained, and on 3 acres of land that had been previously cropped for two years yields of 200 bushels of marketable tubers per acre were secured.

The live-stock investigations on Kodiak Island have demonstrated the possibility of summer pasturing cattle and sheep and their wintering on hay and silage made from the native grasses. About 100 head of purebred Galloway cattle and 100 sheep were carried through the winter entirely on native forage. Eleven cows with good milking records have been purchased to add to the herd, with the view of developing a milking strain of Galloways. The stock-breeding work received a temporary backset through the eruption of a volcano some 95 miles away covering the entire pasture and hay lands with ashes to a depth of 14 inches or more. This has necessitated the removal of the best of the cattle, and arrangements will have to be made for their future disposal. This will make a serious inroad on the resources of the stations and may require additional support during the year.

HAWAII STATION.

Some results of the work of this station in diversifying agriculture are begining to appear. The pineapple industry has risen to second rank among the industries of the islands, and the station's work on soils, pineapple breeding, etc., has contributed very materially to this extension. The effect of manganiferous soils on pineapple growing has been pointed out, and experiments are in progress that seem to promise good results in rendering the manganese less injurious when present in the soil. The work with cotton has been continued, the best results being obtained with some strains of Caravonica cotton. The station's crop was sold for 18½ cents per pound last season, and the buyers ranked it equal to the best Peruvian rough cotton. This form seems to respond better to perennial culture and is less subject to the attack of bollworms than any others tried by the station. The Japanese rices introduced by the station still give satisfaction, and it is probable that the importation of milled rice from Japan will gradually fall off, the locally grown product taking its place. The experiments with fertilizers have again shown the inability of the rice plant, as grown in Hawaii, to utilize nitrate of soda and the great superiority of sulphate of ammonia applied in the first stages of growth of the rice plant. Somewhat similar work with the taro plant shows that it is readily influenced by fertilizers and methods of culture. Continued work on the propagation of mangoes and avocados shows that when properly understood but little greater difficulty is experienced with their propagation than with ordinary deciduous orchard trees. Experiments in tapping Ceara rubber trees, collecting the rubber, and preparing it for market have been carried out and methods devised that are economically profitable. Rubber prepared by the method worked out was rated in New York as but little inferior to the best Para rubber.

The station's demonstration work that is carried on in cooperation with the Territory and private individuals is beginning to attract attention. Five such stations have been established, where attempts are being made to work out local problems and at the same time give visual evidence of the results of scientific investigations carried on elsewhere. These demonstration farms, in conjunction with an effort in marketing carried on by the Territory, it is believed, will aid very materially in diversifying the agriculture of the islands.

PORTO RICO STATION.

The work of the Porto Rico Station has been continued along the original lines looking to the proper diversification of the agriculture of that island. The fruit industry is rapidly increasing in importance, the exports having increased in value from $100,000 in 1901 to over $2,350,000 in 1911. This rapid development has resulted in part at least from the horticultural investigations of the station, which have demonstrated the importance of windbreaks, choice of soils, proper handling of fruit, orchard management, etc. The introduction and propagation of improved varieties of tropical fruits is receiving much attention. Some of these new varieties have fruited and their superiority is plainly shown. Cover crops for orchards are being investigated with pronounced success. The introduction and planting of Eucalyptus trees is being continued, and varieties have been found that are making good growth on the higher and drier lands. The chemical work continues to be largely a study of soil problems. The effect of strongly calcareous soils in inducing chlorosis of pineapples, rice, and other plants has been demonstrated. The fertilizer requirements of the red-clay soils are being investigated, and the causes that result in the so-called " sick " soils are being sought with a view to their probable correction. The plant pathologist and the entomologist are devoting much of their time to coffee pests. The definite causes of several diseases have been worked out and means for their control are being sought. The entomologist is propagating and distributing beneficial fungi and insects for the destruction of certain insect pests. The experiments in the introduction of forage plants are being continued, and among the most promising new plants for this purpose are molasses grass, Rhodes grass, and *Paspalum dilatatum*. Some of these appear drought resistant, and it is thought they will prove valuable for pasture purposes.

The work in improving the live stock is making satisfactory progress. The station added a saddle-bred stallion and a young Morgan stallion to its equipment of stock during the year. The latter animal was secured by transfer from the Bureau of Animal Industry of this department. The number of cross-bred cattle is increasing steadily, and the station has begun the establishment of a dairy herd. At present the only experiment is the production of milk under proper sanitary conditions. The progeny of the half-bred Zebu bulls of the station are in great demand, as the calves are larger, hardier, and make more rapid growth than native-bred calves. The work with swine was interrupted by the death of the entire herd from some infectious disease. The introduction of poultry is progressing rapidly, but the station is unable to meet all the demands for improved strains.

GUAM STATION.

One of the most important events in connection with the Guam Station was the arrival of the purebred live stock from the mainland. These consisted of 6 head of Morgan horses, 5 of Ayrshire cattle, 4 Berkshire hogs, and 8 each of Barred Plymouth Rock and Brown Leghorn chickens. After a trip of a month by transport from Seattle the stock was landed in very good condition. As a precaution they were placed in quarantine for a short period, after which they were transferred to the station. The oldest bull died in about a month with symptoms of tick fever. All the other animals escaped and are reported as growing finely. This stock will be used in an experiment to improve the native stock of the island.

The experiments with field and garden crops generally gave better success than in any previous year, due probably to the improved condition of the soil following cultivation. An extensive experiment with corn has been begun in an attempt to obtain a better yielding variety. This will embrace many tropical varieties, and as corn is a staple food of the island, the importance of its more abundant production is readily seen. The forage-plant investigations have been continued, and Para grass, which was introduced by the station in 1910, has proved well adapted to the island, and several wagonloads of roots have been distributed to natives for planting. It grows rapidly and quickly covers the ground with a thick sward. Experiments with *Paspalum dilatatum* and Guinea grass have continued, but they are surpassed by Para grass for almost every situation and use. Other field crops, including a number of leguminous plants, are receiving attention. Vegetables were almost without exception better in yield and quality than in any previous year. Experiments are in progress in planting vegetables at different times in the year to ascertain for each kind the most favorable planting season. A large number of new agricultural and horticultural crops have been introduced during the period the station has been in existence, and some have already shown their value in their new environment.

A preliminary entomological survey of the island was made by Mr. D. T. Fullaway, entomologist of the Hawaii Experiment Station, who was detailed for that purpose.

During the year the governor of Guam ceded to the station for its use 130 acres of pasture and other land adjoining the station.

IRRIGATION INVESTIGATIONS.

The results of the irrigation census taken by the Bureau of the Census in cooperation with the Office of Experiment Stations have demonstrated four great needs of the irrigated West, namely, (1) more settlers; (2) information and assistance that will enable settlers, both old and new, to make a better and more economical use of their water supply; (3) investigations for the purpose of reducing the cost of pumping and storing of water, of preventing the losses and wastes in distribution and application, and of bringing about a higher duty of water in all irrigated sections; and (4) information regarding better methods of reorganizing irrigation enterprises and operating and managing irrigation systems.

The great need of the irrigated West to-day is not more projects but settlers for the projects that are completed or will be completed within the next few years. The period from 1899 to 1909 saw more than 6,000,000 acres brought under irrigation; yet, making a liberal allowance for the lands that will probably never be profitably irrigated, the enterprises on July 1, 1910, were able to supply water to more than half as much more land; and if the next 10 years is to see two-thirds of the area in projects but not irrigated in 1909 irrigated, 12,000,000 acres must be settled and irrigated. In the past the farming regions of the Mississippi Valley and the irrigated sections themselves have furnished a large percentage of the new settlers, but in the future projects must look more and more to the cities and more densely populated sections of the East for their settlers. The chief irrigation work of the department in the future, therefore, must continue to be the furnishing of information regarding the conditions and possibilities of the different irrigated sections, the cost of obtaining land and water, and the cost and best methods of preparing the land and distributing, applying, and conserving the water, as the success of the individual settlers and the development of the irrigated sections will depend largely upon the newcomers getting properly located, knowing in advance the problems and difficulties to be encountered, and being properly advised and assisted in starting and carrying on their new work.

The average cost per acre of irrigation systems increased 77 per cent and the cost per acre of operation and maintenance 182 per cent in the decade 1899–1909. Further irrigation development, except in comparatively few cases, will be possible only by the construction of still more costly works or by the installation of pumping plants. In but few sections is the water supply sufficient to reclaim more than a small part of the arable land, and thousands of acres of lands will never be reclaimed until a higher duty of water is brought about by the conservation of the flood and out-of-the-season flow of streams, by the introduction of better methods of distributing and applying water, and by the reduction of the waste and losses due to seepage, evaporation, and the applying of water in the wrong stages of crop growth. The data that have been collected and the experiments that are being conducted by this office have demonstrated that with proper installation and operation irrigation by pumping is feasible in many localities and that a large part of the losses and wastes of irrigation water can be prevented at a cost that will render it profitable to do so.

More than 79 per cent of the area irrigated in 1909 is under enterprises managed by the irrigators themselves, and, judging by the trend of the past 15 years, more than 85 per cent of the irrigated lands will be under such enterprises when the projects being constructed at the present time by the Reclamation Service and Carey Act companies have been turned over to the settlers. Officials of cooperative companies and irrigation districts are constantly facing the complicated problems of organizing and financing enterprises and constructing, operating, and maintaining canal systems, and such advice and assistance as this office is furnishing along these lines is of great importance, especially in those sections where most of the land has been settled and brought under irrigation in the past few years. This work is also of special importance, since the directors of such enterprises, by adopting better rules and regulations governing the delivery and measurement of water and the charges for operating and maintaining systems, and by encouraging the use of better methods and practices, will become one of the most powerful factors in bringing about a greater and better development of the irrigated sections.

DRAINAGE INVESTIGATIONS.

PROGRESS IN FARM DRAINAGE.

Farmers are gradually coming to the realization that poor drainage of their cultivated lands is not an unavoidable condition, a permanent handicap imposed upon them by nature. The truth is being pressed upon them, not only that the condition can be remedied, but that the more intensive methods of cultivation which inevitably must be practiced in this country will ultimately compel them to drain their wet land in order that they may derive the largest returns from every foot of their cultivated areas.

The department, so far as the means for this work permit, is endeavoring to impress upon the agricultural interests of the country the economy of land drainage. It is attempting, among other things, to discourage the " hit or miss " methods of laying out and constructing tile drains, which methods not only are likely to result in total or partial failure in the particular tracts concerned but also tend to destroy confidence in drainage in general. A considerable part of the work along these lines consists in demonstrating to the farmer the importance of a careful preliminary study of the controlling drainage factors in the tract he desires to improve, and the necessity of intelligent design of the system and rigid superintendence of construction.

To carry out this work the department has stationed specialists in various parts of the country, particularly in the Southern and Western States, whose services are available to communities, organizations, and individuals who desire expert advice upon particular drainage undertakings. Much of this service is of a consulting nature, but where it seems desirable these representatives make detailed examinations of concrete propositions, sometimes making complete surveys and detailed plans, locating the drains upon the ground, and supervising the construction. These representatives also make inspections of tile drainage systems already installed, with a view to collecting reliable data as to their effectiveness under the conditions in which they operate. Experimental work is carried on under varying conditions of climate, rainfall, topography, and soil to determine the best practice in such details as depth, spacing, and size of tile, effective measures to prevent silting of drains, and the necessary provision for surface run-off. In the arid regions the investigations are designed to meet the peculiar problems presented by the rise of ground water, due to irrigation and the resulting accumulation of alkali at the ground surface.

To the extent that time and means have permitted, the existing tile drainage systems in southern Louisiana have been examined in the endeavor to account for the almost universal ineffectiveness of tile drainage that has hitherto obtained in that section. In every case it was found that efficient drainage was precluded either by defective design, faulty construction, or both. The attempt will be made in the near future to overcome the prejudice that has naturally resulted from those failures by supervising the installation of a number of tile drainage systems in that section.

In Alabama an inspection has been made of all the existing tile drainage systems in the prairie section. Four experimental tile systems have been installed, and the results so far observed indicate complete success of this method of draining where the system is properly designed and constructed.

The department has supervised the installation of a number of tile systems in Georgia and the Carolinas which have been highly successful in their operation.

In Maryland, particularly on the Eastern Shore, and in Virginia the service rendered by the department has resulted in an increasing interest in agricultural drainage, several highly successful undertakings of this nature having been carried to completion under the supervision of the representative assigned to that territory.

NUTRITION INVESTIGATIONS.

Particular attention has been paid to studies of the use of corn meal and its value in the diet in comparison with other cereals. On the basis of data gathered from experiment and experience, a bulletin has been prepared which contains much information which should prove of value to the housekeeper and result in an even greater appreciation of this standard American food crop which can be used in the diet in so many ways.

Experimental studies have also been made of the relative nutritive value of different fats and oils commonly employed for table and cooking purposes, and of ways of using rationally this important group of energy-yielding foodstuffs. This work, which involves studies with the respiration calorimeter, has been undertaken in cooperation with the Bureau of Animal Industry.

As a result of the numerous experiments with cheese, a popular bulletin has been published dealing with the economical use in the diet of this food, which gives directions for its use in many ways and discusses its relative value in comparison with other food materials, the general conclusion being that cheese can be used in quantity in a great variety of ways and that it may be employed to replace meat when this seems desirable. Similar work on the nutritive and economic value of dried fruits has been carried on.

The experiments made in cooperation with the Bureau of Chemistry on the respiration and energy output of bananas during the active ripening period has been continued. The small respiration calorimeter designed for this line of work has proved very useful in securing data which are of great interest in connection with the studies of ripening fruit which the department is carrying on. The methods are applicable to the study of a great variety of problems of vegetable physiology of both theoretical and practical interest and such work should prove of much importance to those who purchase, handle, and market such products and to those who use them in the home as well as to investigators interested in technical questions.

Mention should also be made of the increasing demands which are made for publications and other information on the relative value of food and similar topics. Housekeepers on farms and in towns, teachers, pupils, and others turn to the department in increasing numbers for data on such subjects, and it is apparent that the interest is widespread and genuine. Indeed, this has developed into one of the most important activities of the nutrition investigations and is one of those by which the Department of Agriculture directly helps in the solving of home makers' problems.

OFFICE OF PUBLIC ROADS.

There probably was never a time in the history of the United States when the question of improved roads was under more serious consideration. The process of centralizing the control of highways has gone steadily on and each year sees an added number of States that have established the State highway departments. There remain many perplexing questions in highway technique and in the plan of administration and finance for public highways. The work of the Office of Public Roads of this department has fortunately kept pace with the widespread demand for information and assistance in road matters.

OBJECT-LESSON AND EXPERIMENTAL ROADS.

There have been built during the present fiscal year 32 object-lesson roads under the direction of engineers from this office. Such roads include plain macadam, oiled macadam, bituminous macadam, gravel, sand-clay, and earth roads. The office has also supplied supervision for the erection of three bridges. Twenty-four object-lesson roads built during past years have been inspected for information to guide future work. Some of these roads are in good shape, some show lack of maintenance, but nearly all have proved a stimulus in awakening interest for better methods of construction. Eight sections of experimental roadway were constructed at Chevy Chase, in Montgomery County, Md. These sections were built for the purpose of determining the relative merits of different forms of bituminous material used as binders and dust preventives on macadam roads. A careful traffic census has been taken each thirteenth day since the completion of the work. It is planned to keep accurate records of the cost of maintenance of the various sections and properly to relate such costs to the traffic sustained by the road.

ECONOMIC INVESTIGATIONS AND MODEL SYSTEMS.

There has been an increasing demand for extended inspection by the engineers of the office in various counties. With a view to develop proper model systems of highways, engineers have been assigned to 24 counties. After thorough examination of existing conditions, detailed reports and recommendations have been prepared and submitted. It is necessary in this work to inspect thoroughly the entire county system; to determine the location and quality of road materials; to select the particular roads which carry the main traffic; to examine the financial resources and the plan of road administration and maintenance; and, wherever possible, to prepare maps and sufficient working drawings. Reports submitted to the authorities include all necessary details for carrying out proposed plans of improvement. This model system work has proved one of the most effective ways in which the Office of Public Roads has been able to impart information and render expert service.

SPECIAL INSPECTION AND ADVICE.

The office is frequently called upon by road officials and other administrative officers in towns and counties to supply quick advice on various road matters. Twenty-three States and the District of Columbia have thus enjoyed the benefits of expert advice by highway engineers. Inspection of the State highways of New Hampshire forms the subject of a report issued as Bulletin No. 42, Office of Public Roads. The report treats of the existing conditions and materials, forms of construction, and special problems involved in New Hampshire highways.

INSTRUCTION IN HIGHWAY ENGINEERING.

Graduates in civil engineering from engineering institutions throughout the country may become eligible for appointment to the position of engineer student after passing the required examinations of the United States Civil Service Commission. Examinations were held on March 13 and 14, 1912, and from the register established 10 appointments were made. The students who come to the office in this way receive a thorough training in all parts of highway work in the field and in the laboratory. At the end of their first year many prove worthy and are either promoted to serve in the office or to suitable positions in county or State work. At the close of the second year junior highway engineers are eligible to promotion as highway engineer and may ultimately attain the grade of senior highway engineer.

PHYSICAL LABORATORY.

The laboratory for the testing of road-building stone has continued to be of large service. Samples have been received from 37 States and Territories, as well as from Canada, Porto Rico, and Wales. Research work in the physical laboratory has progressed satisfactorily and includes the testing of a large number of arch culverts in full-size sections. Studies on the subject of expansion and contraction of concrete while setting have proved of interest and results of value are anticipated when the work has further progressed. Observations have continued on the behavior of oil-mixed concrete, and a bulletin showing the progress of investigations has been issued.

During the year various papers were presented by members of the testing laboratory force on results of research work. A bulletin has been issued on the methods and results of physical testing of road materials.

CHEMICAL LABORATORY.

With the increasing use of bituminous materials in modern road construction, the services of the chemical laboratory have become very important. During the year 198 samples of oils, asphalts, tars, and other bituminous materials were received and tested for their road-building qualities. In addition to the routine work of testing material, research work has been carried forward to determine improved methods of testing bituminous materials and the development of the necessary apparatus.

MAINTENANCE.

The attention of all highway engineers has been sharply drawn to the imperative need of better maintenance. Conditions brought about by the increased use of our highways under modern traffic have furnished conclusive evidence of the importance of continuous and adequate systems. An experiment in maintenance on earth roads has been in progress in Alexandria County, Va., on 8 miles of road. The system adopted here is the patrol system. The patrolman is further required to drag the earth road with a split-log drag after each sufficient rain. The results of the work so far indicate that the benefits of such systems can be realized in practice. Detailed information was accumulated as to the proportion of time which it is necessary to devote to the different necessary items of work and the cost of the same. There is a widespread lack of information as to maintenance cost. Considerable work has been done with a view to supplying this need, and it is hoped shortly to issue a bulletin entitled "Repair and Maintenance of Highways."

BOND ISSUES.

More and more counties and townships seem disposed to incur debt for road improvement, and it has accordingly become very common for bond issues to be made in amounts from a few thousand to a million dollars. Bond issues have increased so rapidly that the Office of Public Roads has undertaken an extensive investigation to determine the amounts of bonds issued for road and bridge purposes up to the year 1912. Studies are also under way on the methods of retiring bonds, the condition under which the issue is justified, the best method of financing repair of bond-built roads, and to settle the very serious question of relation between the life of the road and the term of the bond issue.

LECTURES, EXHIBITS, AND ROAD-IMPROVEMENT TRAINS.

During the year the office has continued its policy of presenting the proper methods of road building and maintenance by exhibits and lectures. The models of various kinds of road construction which are prepared in this office have proved of extraordinary interest and value to the public. Exhibits of models and enlarged photographs of road subjects have been made in cooperation with various railroads in special cars on good-roads trains. Models have also been exhibited with pictures at various fairs and expositions. There has been a large demand for talks on good-road subjects. It has been possible to assign men for only part of this service. There have been a total of 1,135 lectures and addresses given. The total attendance at such meetings was 208,472.

RECORD OF SIXTEEN YEARS.

HISTORY OF THE DEPARTMENT'S SERVICE.

MANY SUBJECTS OF WORK AND ACCOMPLISHMENT.

Sixteen years have been of interest in the history of this department. Bureaus have been created and expanded. Lines of research, investigation, and demonstration have been multiplied. Congress has piled duty on duty from year to year. The corps of experts needed in the increasing amount and variety of service has grown greatly. The department has become a great agricultural university for postgraduate work. Discoveries for the benefit of farm practices and improvements of old ones have been countless. The department has both promoted and begun a revolution in the art and science of agriculture. Its influences for agricultural betterment have penetrated all regions of the national domain. At the close of a long administration, filled with accomplishments, it is fitting that the record of 16 years should be written.

EXPANSION OF THE DEPARTMENT.

EMPLOYEES AND APPROPRIATIONS.

Compared with present proportions, most of the department bureaus of 1897 were small, were getting small results from their work, and were confined to few lines of investigation and endeavor. The whole department had on its pay roll in that year 2,444 persons. The number grew to 6,242 in 1906, and rapidly increased to 9,107 in the following year on account of the enforcement of the meat-inspection law and expansion of work in forestry. The number has increased steadily since that time until on July 1, 1912, 13,858 were on the pay rolls of the department.

During the period under review the paid employees of the Weather Bureau have about doubled in number and are now 2,051. The employees of the Bureau of Animal Industry have increased from 777 to 3,311, and of the Bureau of Plant Industry from 127 to 2,128. The work in Forest Service was so small in 1897 that the paid employees numbered only 14. The number increased to 939 in 1905, to 2,012 in 1907, to 3,636 in 1910, and to 4,127 in 1912.

Only 20 persons were employed in the Bureau of Chemistry at the beginning of this period, and the number increased to 546. From 33, the employees of the Bureau of Soils, the number has increased to 159, and from 21 those of the Bureau of Entomology have increased to 339. The Biological Survey has 97 employees in place of 23 in 1897; the Division of Publications, 188 in place of 61; the Bureau of Statistics, 162 in place of 133; the Office of Experiment Stations, 209 in place of 38. In the Library 6 employees sufficed for the work in 1897 and now 29 are not too many. The Division of Accounts and Disbursements has increased from 10 to 66 employees, and the Office of Public Roads finds it has ample employment for 163 employees in place of 7 in 1897.

It has been a difficult matter to determine how many scientists and scientific experts are employed by the department. It is not always easy to certify that a person is or is not a scientist, but attempts have been made at times in the past, and it is a matter of record that from 1902 to 1907 from 1,927 to 2,326 scientists and scientific experts, assistants, and agents were employed.

Along with the increase in the number of the department employees it is to be expected that the appropriations of money by Congress for the use of the department would greatly increase. For the fiscal year ending June 30, 1898, the appropriations for the department amounted to $3,272,902. They increased to $7,109,682.62 in 1905; and by 1907 the amount had risen to $13,079,523.98. In consequence of the requirements of the enforcement of food laws and the care of the national forests, and in a less degree because of the general expansion of the work of the department, the appropriations by 1911 aggregated $20,888,449.28, and for 1913 the total amount is $24,743,044.81.

In wealth produced and in wealth conserved during these 16 years the department has returned to the Nation more than 10 times these appropriations.

PUBLICATIONS.

EVIDENCES OF GROWTH AND USEFULNESS.

The publication work of the department is an unerring indication of its growth and usefulness. The records of the Division of Publications, in which such work is centralized, show that in 1897 the mail requests for publications barely exceeded 500 letters per week. So great has been the extension of the department's relations with the farmers of the country in the 16 years which have just passed that, during the past year, the weekly mail has exceeded 52,000 letters, or more than 100 letters for each one received at the earlier date.

With a printing fund of $116,888, the different publications printed in 1897 were 424, and the editions aggregated 6,541,210 copies; in 1912, with an appropriation of $470,000, the different publications were 2,110, aggregating 34,678,557 copies.

The work of the Division of Publications reflects, and must always represent, the activity of the other offices of the department. All the information acquired in the several bureaus by the means at their command finds its expression necessarily in the form of publications which pass through this office. Every enlargement of the scope of the work covered by any other office, especially the adoption of entirely new lines of work, involves an addition to the work of the Division of Publications.

The appropriations for the fiscal year 1897 disbursed by this division for salaries, supplies, etc., amounted to $44,367, while the appropriations for the fiscal year 1912, available for the same purpose, were $209,960, an increase of nearly 375 per cent.

In 1897 the number of employees in the division was 61, and in 1912 the number aggregated 197, an increase of nearly 225 per cent.

NUMBER OF COPIES DISTRIBUTED.

During the 16-year period over 225,000,000 copies of publications have been distributed to those engaged or interested in farming. Of this number slightly more than 88,000,000 copies were farmers' bulletins.

Although the series of farmers' bulletins was begun in 1889, only about 5,000,000 copies had been issued by 1897, and those distributed during that year amounted to less than 2,000,000 copies, while during the year 1912 over 10,000,000 copies were distributed. Previous to the period under discussion only 41 different farmers' bulletins had been prepared, and at this date there are 506 separate pamphlets discussing nearly every phase of modern farm operations.

No other Government issues as many publications as does the United States, and no executive department of this Government issues as many publications as does the Department of Agriculture in performing its function of acquiring and disseminating useful information in regard to agriculture. But the rapid increase in the population of the country and the great popularity acquired by the documents of this department have so augmented the demand that the department has not in recent years had an appropriation that permitted the printing of a sufficient number of copies to meet the demand.

Congress, however, has provided a solution of the problem by authorizing the superintendent of public documents to reprint and sell at a nominal price such documents as may be required. The enormous increase in the sales by that official of this department's publications is surprising when it is remembered that millions of copies are distributed free, both by the Department of Agriculture and by Members of Congress. During the last fiscal year 171,866 copies were sold by the superintendent of public documents, for which he received $16,428.

The magnitude of the work of disseminating the vast fund of information so systematically sought and so scientifically verified is commensurate with the enormous advance made in the application of scientific knowledge to practical agriculture by the farmers of the country—a result in which the department has been a marked factor. The improved conditions on farms, the increased yields of crops, the suppression of animal diseases and improved methods of breeding, feeding, and selection of live stock, and the new varieties of fruits resulting from the department's labors as detailed and explained in its publications have added many millions to the wealth of the Nation.

PLANT INDUSTRY.

OUTLINES OF POLICY.

In one of the earlier reports of the present Secretary of Agriculture he set forth the policy with respect to plant-industrial work. It was stated that it would be the aim of the department to bring the scientist to the help of the people; to ascertain what imported crop plants might be produced in our country; to search the world for grains, fruits, vegetables, grasses, and legumes that might be found useful here; to secure new varieties of plants by breeding and selection; to control destructive diseases; to open new markets for plant products, and to improve methods of handling, shipping, and marketing things the farmer grew, especially the more perishable crops. Following is a brief review of some of the more important results accomplished along these lines:

In the earlier stages of the work a cohesive and effective organization was lacking. Twelve years ago the first steps were taken to bring all the forces together, resulting in the organization and development of the Bureau of Plant Industry. Little need be said about the methods and purposes of this bureau. Its work speaks for itself. It has no police or regulatory duties to perform; hence, the energies of its corps of nearly 1,500 laboratory and field men may be devoted exclusively to helping the 6,000,000 or more farmers in ways that have from time to time been set forth in these reports and which have brought about the things herein briefly recorded.

NEW CROPS AND NEW INDUSTRIES.

Since 1898, when the plant-introduction work was inaugurated, the department has actively pursued this field of study. At the present time the department has six important field propagating stations, has brought in something over 34,000 plant varieties and species from every quarter of the globe, and has sent out the progeny from these introductions by the hundreds of thousands to experiment stations and private experimenters and plant breeders throughout the entire United States and its tropical possessions. It has kept a historical record of all these introductions and distributions and accumulated a most extensive collection of data bearing on new economic plants.

This is the first systematic attempt by any government to supply its bona fide plant experimenters on an extensive scale with the material out of which new plant industries can be built.

The department has originated the profession of agricultural exploration and has sent out as agricultural explorers 25 trained men whose search has taken them through many of the cultivated regions of the world and has already been the means of bringing to the notice of the American farmer many of the farm customs and practices of the centuries-old farm civilizations of other countries.

AIDING RICE FARMERS.

One of the earliest explorations undertaken in this field was for the purpose of aiding the rice growers of the Southern States. During the year 1898 and again in 1901 an explorer was sent to Japan, China, and India for the purpose of securing short-kernel types of rice better adapted to the conditions of southern Louisiana and Texas and more suited to the needs of the market, especially as regards milling qualities.

The great growth of the rice industry is a matter of history. Lands which 15 years ago were selling at the nominal price of two or three dollars per acre have come to have values of $30 to $50 an acre. The total output of rice in this time has increased from 96,886,400 pounds in 1896 to 637,055,556 pounds in 1911. Not all of this advance has been due to the department's introduction work, but the industry received an impetus at that time that has gone far toward making it what it represents to-day.

GRAINS AND OTHER CROPS FOR SEMIARID LANDS.

About the time an interest in rice was being developed another explorer was sent to Russia for the purpose of securing help in the matter of grains adapted to our northwestern semiarid regions. A large extent of territory in this section was yielding no valuable crop returns. As a result of this first exploration work in 1898, followed by a second trip in 1900, large quantities of drought-resistant durum wheat and other varieties of wheats, oats, and special cereals were brought in. The results of this work are found in the rapid extension of the durum wheat throughout the northwest territory and the distribution and extension of the Swedish select oats throughout several of the Northwestern States.

The whole alfalfa question in the United States has been put on a new basis by the introduction of the Turkestan, Siberian, Arabian, and Peruvian alfalfas and the development of the hardy hybrid strains which grow in the Southwest throughout the winter. The introduced Swedish barleys have created a new situation in the barley-growing industry of Montana, Idaho, and California.

NEW FRUITS AND OTHER CROPS INTRODUCED.

The seedless grapes of Italy and Greece have begun to have their effect on the table-grape and raisin industries of the Pacific coast. The Bohemian horse-radish has supplanted the old variety in New Jersey as a better yielder and a better flavored sort.

The date palm has ceased to be a curiosity in the desert regions of the Southwest, and its cultivation is becoming an important plant industry. The dasheen, a root crop for the South, has proved its possibilities as a food producer and will probably rival the potato in the South for lands too moist for this staple crop.

The Chinese wood-oil tree, from the nuts of which the best varnish oil in the trade is produced, has fruited successfully in the Gulf States and promises a new crop for cheap lands which can be harvested during the slack-labor season.

The Chinese wild-peach stock has proved to be hardy in the Middle West in sections where the hardiest varieties heretofore known have been killed to the ground, and it also promises to be the earliest stock in California. Groves of the timber bamboo are now established in Florida and Louisiana.

Groves of the superior-flavored oriental mango, first encouraged by the department, are now fruiting in Florida, Porto Rico, and Hawaii, and this fruit tree is beginning to attract attention in southern California.

The Guatemalan and Mexican avocados and selected seedlings of West Indian and Florida origin are creating a new fruit situation in California and Florida.

The Smyrna fig industry of the Pacific coast is now established, and the introduction by the department of the insect-carrying caprifig has become a matter of history. Over 1,000 tons of this choice fig were produced last year.

The pistache nut of the Orient, together with its relatives from China and the Mediterranean region, have been introduced and proved valuable for Pacific coast conditions.

The introduced Chinese jujube has proved adapted to Texas and other portions of the Southwest, and a new dry-land fruit tree, comparable in a measure to the prune, has been added to our horticulture for semiarid regions.

The Chinese persimmon varieties have proved quite as well adapted to conditions in America as the Japanese varieties and are showing certain advantages over them. They have added a distinct new type of fruit to our fruit culture.

The cork-oak acorns, which were early introduced, have grown into large trees and have demonstrated the possibility of growing American cork.

EXPLORATIONS UNDER WAY.

During the past year an agricultural explorer was sent through the steppe regions of western Siberia, south of Omsk, to make a detailed study of the behavior of the yellow-flowered, hardy alfalfa on the cattle ranches there, and he made contracts with the peasants for all the possible seed for special experimental tests of this plant in the Northwest. He imported the Siberian bush cherry, which he believes will become important for the extreme northern tier of States, and the Siberian larch, which is the fastest-growing conifer of that region, together with several hundred dry-land grains, forage crops, and fruit-tree varieties.

As a result of a survey of the East Indian cattle-raising country, which the forage-crop expert of the department was sent to make, some promising Indian forage grasses were secured, which may prove valuable for the Southern States. An investigation of the Egyptian date region resulted in the introduction of new varieties of date palms for the experimental plantings in the Salton Basin.

A special effort has been made to secure plants from the dry and cold regions of central Asia, including the little-known Chinese Turkestan. This exploration work has been continued actively the past year. As a result of the establishment of a new plant station in North Dakota, at Mandan, it has been found necessary to look further for crops that may be brought in, established, and tested at the station, with a view to using them for breeding purposes and distribution throughout the entire Northwest to help the farmers of that region.

Numerous types of dry-land poplars and other trees suitable for wood, windbreaks, etc., have been located. Valuable shipping varieties of table grapes, hardy wild apples and apricots, and a number of wild forage legumes from the Siberian steppes have been located and are now being secured in quantities for distribution and testing in the years to come.

SPECIAL WORK ON FORAGE CROPS.

A great many valuable introductions have been made through correspondence and in ways other than through explorers. This is the case with forage crops for nearly all parts of the country. Sudan grass, a wild form of sorghum, although introduced only four years ago, is now greatly in demand in the southern portion of the Great Plains region on account of its ability to produce an abundance of good forage under conditions of low rainfall.

In Florida and the immediate Gulf coast region a good hay grass has long been a desideratum. Rhodes grass, secured from Africa, promises practically to solve the hay question for that portion of the South.

Renewed interest has been awakened in the soy bean by the establishment in general use of new varieties secured from China and Japan. These varieties have proved far superior to those originally grown. Likewise, new and improved varieties of cowpeas have been introduced and developed, thereby extending materially the usefulness of this very important crop. The origination of improved varieties of timothy by selection and breeding has opened up great possibilities along the line of improving the most important grass-hay crop for the United States.

Much attention has been given to the extension of alfalfa, and our efforts have met with marked success. At the present time this valuable forage crop is becoming a staple in many sections of the Eastern States and promises to increase rapidly in importance during the next few years.

During the past year marked advance has been made in the work with the hardy and drought-resistant alfalfas introduced from Europe and Asia. The crossing of the yellow-flowered form with the common species has resulted in some very promising hybrids adapted to use both as hay and for grazing in the Great Plains region. The value of the new alfalfa for hybridizing can scarcely be overestimated.

The increasing difficulty of obtaining and maintaining profitable stands of red clover has long been a matter of serious concern in many parts of the clover belt. Investigations started last season are already indicating the solution of this problem. Efforts to develop methods of handling the clover-seed crop in order to make it more certain are meeting with success.

Rhodes grass and Sudan grass have this season even surpassed expectations. Extensive seedings of both of these grasses have been made, so that there is now abundant evidence of their value under field conditions.

Work with the sorghums and other drought-resistant forage crops has continued to give results of great importance to the dry land of the West.

AIDING THE IRRIGATION AND DRY-LAND FARMER.

AID FOR IRRIGATION AGRICULTURE.

The past few years have witnessed remarkable growth in the development of agriculture in all that region lying west of the one hundredth meridian. The great irrigation projects undertaken by the Government and private agencies have stimulated an interest in agriculture to such an extent that the department has found it necessary to give help along many lines of crop production. To do this, investigational work was necessary.

This has been carried on, in so far as relates to irrigation agriculture, at eight field stations located in the Western and Southwestern States. All these stations, with two exceptions, are operated in cooperation with the Reclamation Service. The primary object of these field stations is to furnish investigational bases at which the various specialists of the Bureau of Plant Industry can work, with a view to getting an understanding of agricultural conditions and problems which characterize the different sections. They are also intended to facilitate cooperation in the solution of problems relating to irrigation agriculture, the improvement of existing industries, and the investigation and establishment of promising new industries.

In addition to the purely investigational work, a great deal has been done in fostering community action with respect to the development of industries especially adapted to the irrigated regions.

The major portion of the work at the field stations is still in progress, but some lines have been completed, and in these and other lines numerous specific results have been accomplished.

At the San Antonio field station it has been found that the ravages of the sorghum midge, which formerly did very great damage to the grain-sorghum crop, can be entirely avoided by the practice of early planting; that the utilization of indigenous fruit plants as stocks for cultivated varieties greatly improves the possibilities of fruit production in that region, because the native stocks are better able to withstand the conditions of soil and climate peculiar to the locality; that certain varieties of forage sorghums, winter oats, and annual legumes are very much more dependable as forage crops than anything that was generally grown in the section prior to the establishment of the station; and that one variety of Canada field peas, useful as forage, green manure, and as a winter cover crop, will successfully withstand the winter temperatures and produce a satisfactory yield.

An important part of the work at the Yuma field station, at Bard, Cal., is the experiments with Egyptian cotton conducted in cooperation with other offices of the bureau. It has been found that the methods of planting, cultivation, and irrigation as practiced in Egypt are not applicable to the southwestern United States. Upon the recommendation of bureau officials, about 700 acres of land were planted to the crop this year in cooperation with farmers on the Salt River, Yuma, and Imperial Valley irrigation projects, and two specialists have been detailed to supervise the field work of the cooperating farmers. The results so far are extremely encouraging.

The work on the Williston project in North Dakota consisted chiefly in giving expert assistance in the construction and use of farm irrigation systems to the new farmers who came to live on the irrigated lands. At the close of the present season it was found that the work had progressed far enough to enable the farmers to dispense with the services of the irrigation expert who had been maintained at Williston, and his employment was therefore terminated.

At the Fallon (Nev.) field station one of the chief problems has been the devising of methods for the reclamation of the highly impervious alkaline soils which comprise a large part of the Truckee-Carson project. Various methods have been attempted without success, but recent experiments strongly indicate the practicability of using gypsum or lime on the soil to increase its permeability and installing farm drainage systems to carry away the alkaline salts leached out of the soil by irrigation. One more year's results will be required before this method can be recommended with certainty.

Probably the most serious problem which has been encountered on the project is the eradication of the nematode gallworm affecting potatoes and some other crop plants. In 1910 and 1911 the disease was so extensive as seriously to threaten the potato-growing industry in Nevada. Investigation has shown that certain crops are seldom or never affected by the gallworm, and that the growth of these crops for a series of years affords about the only effective method of eradicating the parasite from infested areas. A publication giving suggestions for the avoidance and eradication of the pest was issued in February, 1912, and distributed among the farmers of Nevada.

A considerable quantity of educational work has been done on the project, not only with field and garden crops, but with ornamental plants for use in home making as well. Several thousand shade trees have been purchased and set out by the farmers under the direction of the farm superintendent, and excellent growth has been made, particularly by black locust and Carolina poplar.

The work at the Umatilla Experiment Farm, at Hermiston, Oreg., is comparatively new, but some few definite results have already been secured. It has been found that young nursery stock is very much more dependable for orchard planting on the Umatilla project than trees two or more years old. The experiments with winter cover crops have shown the superiority of the vetches for such purposes. There has been noted a decidedly depressing effect on the growth of the trees where alfalfa is grown in the orchard close to the trees.

DRY-LAND AGRICULTURE INVESTIGATIONS.

For the past 30 years there has been an ever-increasing interest in the agricultural development of the fertile plains extending from the base of the Rocky Mountains eastward for an average distance of about 300 miles and from the Canadian boundary on the north to the Gulf of Mexico on the south. This area is known as the Great Plains. It is in this area that dry farming has reached its most extensive, if not its highest, development.

The term " dry farming " is one that has come into general use to meet the need of a descriptive name for that type of farming which has been developed without irrigation in semiarid regions where irrigation is desirable but impracticable.

Prior to the year 1906 the department had carried on various lines of investigations in this area, dealing with some of the more important specific agricultural problems, such as grain and forage-crop investigations, but by this time it had become evident that if the agricultural problems which the settlers and home builders had to meet were to be solved there must be a much more comprehensive plan of investigation devised.

To meet this need the Office of Dry-Land Agriculture was organized and placed in charge of a man who had had long experience in this region both as a practical farmer and as an investigator at one of the State experiment stations. In the organization and development of the work the following objects were recognized as fundamental: To establish and maintain close personal contact with the actual settlers and their problems and to work out these problems under the same soil and climatic environment as that surrounding the settlers; to establish a sufficient number of field stations, so distributed as fairly to represent the area as a whole; to have these stations established on a permanent basis, so that the work would continue uninterruptedly through a long series of years; to have the work at all the stations so thoroughly coordinated that results obtained at each would be comparable with that of all the others; to enlist the active cooperation of the State experiment stations and of the various bureaus and offices of the department, of State, county, and municipal organizations, and of practical farmers along all lines of investigation having a bearing upon dry-land farming.

With the above-mentioned considerations constantly in mind, the work of the Office of Dry-Land Agriculture has rapidly developed in the last six years, until it now has under actual operation or in process of development six fully equipped field stations under its own financial and administrative control, and provides field and laboratory facilities for many other cooperating investigators. These stations are located at Mandan, N. Dak.; Ardmore, S. Dak.; Akron, Colo.; Woodward, Okla.; Dalhart, Tex.; and Tucumari, N. Mex.

It is carrying on its investigations in cooperation with the Office of Western Irrigation Agriculture at three stations, namely, Huntley, Mont.; Bellefourche, S. Dak.; Mitchell, Nebr.; and with the Office of Cereal Investigations at Amarillo, Tex.

It is conducting its work in cooperation with the State experiment stations at eight stations, namely, Judith Basin, Mont.; Williston, Dickinson, Hettinger, and Edgeley, N. Dak.; North Platte, Nebr.; and Hays and Garden City, Kans.

At all of the above-named 18 stations investigations in crop rotations, cultivation and tillage methods, the conservation of soil moisture, and meteorological observations are being conducted in a systematized manner. In addition to these, many special problems are being studied through cooperation with other investigators.

If this work continues to develop in the future as it has in the past six years, it will result in the accumulation of a mass of carefully recorded and thoroughly coordinated scientific data based upon original investigations and having a direct bearing upon the fundamental agricultural problems of a vast area, such as has never before been undertaken, and the value of which to the present and to future generations can not be overestimated.

If this country is to continue to produce food for its own people with a surplus for export, all of the fertile semiarid lands must be made to produce some kind of food product, and this must be done without the fearful loss in ruined fortunes and wrecked lives which has accompanied the unsuccessful attempts in the past to develop the agriculture of some parts of this area. This can be accomplished by a thorough understanding of the problems involved, which can be gained only by investigations of this character and scope.

CROPS RESISTANT TO ALKALI AND DRY-LAND CONDITIONS.

Problems chiefly associated with irrigation and dry-land agriculture have to do with alkali resistance of various crops. The alkali resistance of numerous crop plants has been tested comparatively at field stations in the Western States, and the results have been supplemented by observations in northern Africa, where agriculture has been carried on for many centuries in the presence of alkali. The data thus obtained have made possible definite recommendations regarding the crops best adapted to various types of alkali in the United States. Laboratory experiments during the same period have afforded much information concerning the relative toxicity of the different alkali salts and concerning the influence of alkali upon the utilization of soil moisture by plants.

Success in breeding crop plants for dry-land agriculture depends upon a thorough understanding of those features of structure and function which enable plants to cope with a meager supply of water. Recent field and laboratory investigations of the bureau have largely cleared up the obscurity surrounding this subject. Adaptability to dry-land conditions has been found to depend not, as has generally been supposed, upon superior ability to extract water from a dry soil, but, primarily, upon ability to manufacture a given quantity of dry matter with a minimum expenditure of water. The results of these physiological investigations are being practically applied in breeding drought-resistant strains of various crops for the Great Plains region.

The native vegetation on different types of land in the Great Plains and Great Basin regions has been studied in relation to the various factors of physical environment. The results prove that the composition and character of the natural growth is a reliable indicator of the capabilities of the land for crop production, reflecting with remarkable sensitiveness the average conditions with respect to soil moisture and the presence or absence of injurious quantities of alkali. These investigations indicate that the native vegetation can be used in the rapid and accurate classification of new land as (1) suitable for dry farming, (2) suitable for crop production under irrigation, and (3) nonagricultural.

PROGRESS IN COTTON WORK.

For the past 12 years systematic work has been carried on with a view to discovering fundamental principles which would aid the producers of the South in the matter of securing better types, larger yields, and varieties of cotton resistant to various diseases. The breeding work has resulted in securing numerous varieties which have taken their place among the people as standard sorts.

The advent of the boll weevil made it necessary to give careful consideration to the readjustment of cotton varieties throughout the invaded territory. This work led to discoveries of great importance in the matter of local adjustment, a hitherto neglected factor. It also developed the important fact of the serious deterioration of cottons by chance hybridization.

As a result of these several lines of work the importance of community action as a means of limiting the cotton grown in any particular region to a single variety has been shown. It has been further shown that the methods necessary to preserve a variety are totally different from the methods employed to develop new varieties. As the work of improving the types developed it became more and more evident that decisive steps had to be taken in the matter of aiding the producers of cotton in marketing their product.

With a view to bringing this about the department for a number of years conducted certain work directed toward bringing about improved conditions, especially through the establishment of national standards for American cotton. Recently those phases of the work dealing more specifically with handling and marketing have assumed such importance that an independent project has been established for their proper conduct.

That the prevailing methods of distributing this great staple crop require radical improvement and simplification has been recognized for some time. The present methods are expensive and wasteful of fiber. They are so highly complicated that only the specialist middleman, very rarely the grower, is able to operate successfully in the selling end of the business. There are opportunities for inaugurating improvements all along the line from the time of picking until the staple reaches the spinner, but no one element in the industry acting alone can bring about the necessary changes.

The department inaugurated and is developing the movement toward cooperation in the matter of growing cotton and cooperation in the matter of marketing of the same. A study is being made of cooperative efforts in the handling of other crops, and educational work is being conducted in order to place in the hands of farmers the information necessary to enable them to organize for producing and marketing purposes.

ADVANCES IN CORN CULTURE.

The past 12 or 14 years cover history of great interest regarding the improvement of our most important crop. At the beginning of this period little concerning the improvement of corn had been recorded. Plant breeding attracted wide interest, and general attention turned suddenly to corn. All sections of the country were filled with descriptions of points that constitute fine-appearing ears of corn. By many careful workers these points were strictly adhered to for a number of years, resulting in demonstrating that in appearance corn is readily improved, but that fine appearance is not necessarily an indication of greater productiveness or profitableness.

When these facts were thoroughly established by practical field work, the general interest in "fancy point" breeding gave way to a general demand for a method of corn improvement that would prove profitable. Our corn investigators in 1901 took up work under different environmental conditions to determine methods of corn improvement that would give profitable results. Methods of corn breeding and seed selection have been pursued during the past 12 years at these points with results proving that judicious breeding makes possible the production of much more profitable corn crops than can be otherwise obtained.

The methods of breeding that have proved most satisfactory are those that have been modified from time to time to suit the changing requirements of the strain of corn and its adaptation to its environment. It has not been by established methods, but by the constant exercise of good judgment that substantial and profitable improvements have been accomplished.

These demonstrations under various environments that by seed selection alone various varieties of corn can be rendered 25 or 50 per cent more productive, are serving to start corn-improvement work in many counties. Local features are so largely involved that much of the work must be accomplished by local enterprise, and where the possibility of substantial results has been demonstrated local enterprise is taking hold of the work so enthusiastically that the department has had more calls for leaders, plans of operation, and solutions of corn problems than it has been possible to supply.

The past year's work has added further proof that some of the many imported strains of corn having diverse characters and adaptations are proving of great value in localities in which their peculiar adaptations of drought or insect resistance are needed.

Because of its intrinsic value the corn crop is rapidly becoming linked with nearly all the leading enterprises of our country. It is now more than a question of growing corn. There are questions of kind and quality and methods of utilization to be considered from hygienic as well as financial viewpoints.

The demonstrations that have proved that profits are greatly increased by the application of methods of corn breeding, seed selection, seed preservation, judicious crossbreeding, etc., have returned financial values far in excess of the cost of making the demonstrations.

RESULTS OF THE TOBACCO INVESTIGATIONS.

In the tobacco work, which was inaugurated in 1898, it was apparent from the outset that the average yield and profit per acre from this crop were comparatively small, and it was found that this condition was due primarily to the growing of mixed and undesirable types, failure to follow sound cultural methods, particularly in the matter of crop rotation and fertilization, damage to the crop from insects and diseases, and lack of understanding of the vital features of successful curing, fermenting, and handling of the leaf. All of these problems have been taken up, resulting in marked improvements in the old methods of tobacco production.

The old standard types have been improved by seed selection, and in the Connecticut Valley, Maryland, and Ohio new types have been produced by breeding which are much more productive than the old types. Desirable foreign varieties also have been successfully introduced, such as the Sumatra and Cuban wrapper leaf and the filler grown from Cuban seed.

It has been clearly demonstrated that in most of the export and manufacturing tobacco districts the continued growing of clean-cultivated, humus-depleting crops on the tobacco lands, with little or no attention given to soil-improving crops like the grasses and legumes, combined with improper methods of fertilizing, is the primary cause of the small yields of tobacco.

A great deal of hay has been imported into these districts each year, while practical demonstrations have shown that the growing of grasses for hay is just what is most needed on these soils to obtain the best results with tobacco. Our experiments and demonstrations have shown beyond doubt that the yield and value of the tobacco crop in these sections can easily be doubled by combining well-planned systems of rotation with the use of the proper quantities and forms of commercial fertilizers. It has also been shown that the growing of winter cover crops is highly beneficial to tobacco.

The fundamental principles of curing and fermenting have been thoroughly studied and practical applications of the results of these studies have been made in the cigar-wrapper leaf and flue-cured districts with striking success. It has been shown that the diseases and damage from other causes during the curing processes can be readily controlled by proper methods. Among the field diseases of tobacco which have been brought under control may be mentioned particularly tobacco-root rot, which formerly did much damage in some sections.

The tobacco work of the last year has followed along the same general lines as formerly. The work with the export types in Kentucky has been extended into Tennessee, with headquarters at Clarksville. The principal results obtained are the development of a very promising new type for the broad-leaf district of the Connecticut Valley, very large increases in yields of tobacco from improved methods of fertilizing in New York State and from crop rotation and fertilizer demonstrations in the manufacturing and export districts, and effective demonstrations in improved methods of curing in the flue-curing and in the Burley districts.

PURE SEED FOR THE FARMER.

Great progress has been made in the matter of securing good seed for the farmer. The early laboratory work inaugurated has been gradually extended until the present time, and the laboratory located in Washington, together with the five branch laboratories maintained in connection with the State agricultural colleges and experiment stations, has tested more than 120,000 samples of seeds for purity or germination or both.

This work, continued from year to year, has resulted in a much better understanding of the nature and value of pure seeds and has added much to the upbuilding of agriculture. As a result of the information contained in publications on adulterated seeds the sale of adulterated alfalfa and clover seed has practically ceased, and the quantity of other adulterated forage-plant seed on the market is now small in comparison with what it was when these publications were undertaken.

Among the results to which the work of this laboratory and those of the State experiment stations have contributed is an awakened interest in better seeds on the part of farmers. This is evidenced by the steady increase in the proportion of high-grade seeds on the market each year. Seedsmen are now taking an active interest in seed testing. They are themselves learning to test seeds, and many firms have fitted up seed-testing laboratories of their own.

The seed-importation act passed at the last session of Congress will prevent the few unscrupulous seed dealers from bringing into the United States low-grade forage-plant seeds which do not find a sale in foreign countries, but which have previously been imported into the United States in considerable quantities.

During the past year the seed-testing laboratories have been continued. The work has been carried on along lines similar to that of previous years. The investigational work has been divided between studies on the physiology of germination and the critical examination of closely related seeds with a view to their easy recognition. Forage-plant seeds, including redtop and hairy vetch, have been examined for the presence of adulterants. Samples of seeds submitted for the purpose of analysis have been examined and reports on their quality have been made to the persons sending the samples. Branch laboratories have been opened in cooperation with the agricultural experiment stations in California and Louisiana, and those in Oregon, Missouri, and Indiana have been continued.

ARLINGTON FARM AND HORTICULTURAL INVESTIGATIONS.

The area developed as the Arlington farm was transferred from the War Department to the Department of Agriculture in 1900. The improvement and development of the farm as a field laboratory for the Department of Agriculture was seriously started in 1900. Surveying, grading, and draining operations were begun the first year. Since then the present equipment, consisting of two dwellings, a large barn, shop, tool storage and boiler house, greenhouses, tool sheds, drug laboratory, and refrigerating plant, has been installed.

Previous to 1901 all the attention given to the vegetable crops originated in the Division of Pomology. Coincident with the development of the Arlington farm activities along the lines of market gardening, truck farming, and vegetable gardening were undertaken.

The Irish-potato investigations are to-day represented by a chain of field stations located in Maine, New York, Virginia, West Virginia, Michigan, Wisconsin, Minnesota, North Dakota, Nebraska, Colorado, California, and Idaho, which have been developed since 1903. Varieties of potatoes have been obtained from Europe and from South America, in addition to those common in the American trade, to test their disease resistance. Tests are under way to determine the adaptation of varieties to special localities for commercial purposes, as well as to determine those localities that can most economically produce seed of superior merit for regions which have to depend upon a foreign seed supply. The hill-selection and tuber-unit method of breeding potatoes for maintaining the vegetative vigor and productivity of our standard sorts has been improved and has given remarkable results in some regions where crop failures have been a severe blow to the potato industry.

The sweet-potato investigations, which were undertaken about the same time as the Irish-potato investigations, have resulted in determining the identity of varieties and have developed a method of utilizing the sweet potato for stock food which needs only to be carried to those regions where sweet potatoes can be cheaply produced. At the present time an effort is being made to solve the storage problems of sweet-potato growers.

The peanut investigations, which were begun in 1905, have proved of great advantage to the boll-weevil districts of the South by carrying to these regions a money crop of as great value as cotton, thus increasing the desirability of establishing a crop-rotation system. The invention of machinery that takes the place of hand labor in digging and picking the nuts has removed the industry from one confined to small areas, because of labor restrictions, to an industry which can be conducted on as extensive a scale as potatoes, beans, or other crops which require similar handling.

At the beginning of these investigations no peanut-oil industry existed in America. At the present time several of the cotton mills located in the peanut-producing area are installing machinery for the expression of peanut oil. Coincident with the expansion of the peanut industry through the South, a remarkable extension of the use of the peanut both as a human food and as a stock food has developed. Single firms use as many as 150 carloads annually in the manufacture of peanut butter and confections.

PROGRESS IN POMOLOGY.

The fruit industries of the country are assuming large proportions. Their growth, especially during the past decade, has been rapid. The work of the department in this field has for its object the aiding of fruit growers along a number of important lines. Special efforts have been put forth in the matter of educational work in connection with the simplification of fruit nomenclature. As the interest in orchard and fruit planting develops, there is more and more demand for authentic facts relative to varieties. The identification, classification, and grouping of varieties have formed an important line of work and have been fully systematized and organized, to the end of helping fruit growers everywhere.

MAPPING OF FRUIT DISTRICTS.

Early in the development of the pomological work it was deemed important to inaugurate investigations in connection with the mapping of fruit districts. It was understood that certain kinds of fruit would succeed in one place and would not succeed in another. No very definite and specific information was at hand as to the factors governing successful fruit production in different parts of the United States.

Work along these lines has proceeded now for 10 years, with the result that some of the more important fruit regions of the Eastern States and the western central portion of the United States have been indicated. Last year this work was extended into Oklahoma, Kansas, Nebraska, northern Texas, and portions of New Mexico and Colorado.

FRUIT MARKETING, TRANSPORTATION, AND STORAGE.

One of the most important fields of effort in aiding the fruit grower has been in the direction of fruit marketing, transportation, and storage. These investigations have been pushed vigorously now for nearly a decade, with the result that in a number of sections of the country the handling, transportation, and storage of fruits have been practically revolutionized. This is especially the case in southern California, where the conditions affecting the fruit industry, including the cooperative-marketing organizations among the fruit growers, afford an unusually favorable opportunity to work out through experiments in orchards and packing houses the fundamental principles involved in fruit handling and storage.

Studies of transportation conditions pursued on transcontinental trains and in the receiving markets were also prosecuted. These studies have resulted in the development of that preparatory treatment of fruits for transportation known as precooling, which appears destined to play a very important part in the future development of transportation and storage of all perishable horticultural products. The beneficial results of this work are already apparent in many fruit-growing sections of the country where, with some modification, the principles discovered in California have been applied in the commercial handling of fruits, including the orange and pomelo shipping in Florida and the peach, pear, grape, and berry shipping of both the Eastern and Pacific Coast States.

The viticultural industries of the country have been looked after in connection with the general fruit work of the department. Experimental vineyards have been established in California and elsewhere with the object of securing data relative to the governing principles in the matter of successful crop production.

A special effort has been put forth in encouraging the production of grapes in the Southern States, especially those of the Muscadine types. Nut culture has also received special attention in connection with the progress of the general fruit work. Studies have been made of the principal species of nut trees grown in the States east of the Rocky Mountains with a view to determining the adaptability of the varieties. Further studies have been made of the details of orchard operations with a view to advising and assisting those who are desirous of engaging in this industry.

SEED DISTRIBUTION.

It is gratifying to review the progress made in the securing and distribution of seeds by the department. By a combination of clear-cut business principles and scientific knowledge the work has developed smoothly along satisfactory lines. Within the last decade, ever since the work has been handled exclusively by the Bureau of Plant Industry, more than 7,000 tons of seed have been secured, tested in the laboratory and in the field, assembled, and distributed.

Early in the work it was determined to conduct it in such a way that all the seed secured and sent out should be of high quality. It was determined furthermore to eliminate costly practices of hand work and to introduce, wherever practicable, modern mechanical appliances for facilitating operations.

Notwithstanding the fact that the quantity of seeds secured and distributed has nearly doubled in the past 10 years, the actual cost of handling the distribution is less now that it was 10 years ago. The funds saved by good business management have gone toward improving the quality and quantity of the seed and have enabled the department to take up a number of special lines which have resulted in much good.

Special features of seed distribution have been maintained, such as securing and distributing types of cotton better adapted to certain conditions in the South. Many of these types have been developed through breeding and selection. The extensive propagation of new types of citrus fruits adapted to home use has also been followed. Large numbers of citranges developed by the plant breeders of the department have been propagated and sent out under congressional distribution. Large quantities of special forage-crop seeds have been distributed in all parts of the country.

There is just now being put into effect a plan for the distribution of special seeds adapted to dry-farming conditions. The future success of dry farming in the semiarid districts will depend in large measure on the adaptation of suitable crops for these districts. An appropriation was made for this purpose at the last session of Congress, and special types of sorghums, wheats, oats, barleys, grasses, and legumes of various kinds will be distributed the coming year throughout the entire semiarid region.

In connection with the congressional vegetable and flower seeds there has been a steady improvement in the quality distributed, and that this has been appreciated is shown by the increased demand for them. That part of the congressional seed distribution covering vegetables and flowers for 1912–13 will require about 600 tons of material. These seeds will all be assembled, packeted, and distributed by the 1st of April, 1913. In round numbers, about 61,000,000 packets will be put up and mailed. In addition, there will be special sets of cotton seed and special sets of seed adapted to dry farming, as already indicated.

GRAIN GRADING AND GRAIN STANDARDIZATION.

The investigations pertaining to the conditions affecting grain crops after production, i. e., the methods of harvesting, transporting, grading, and marketing grain, have been productive of excellent results. During the year approximately 25,000 samples of grain have been tested and analyzed. Tests for acidity, which denotes soundness, were made of over 5,000 samples of corn. Stock-feeding tests are now being conducted in cooperation with the Bureau of Animal Industry, to determine whether or not corn of high acid content is detrimental to stock as food.

Definite progress has been made in determining the changes which take place in grain while in storage and in railroad and ocean transportation, special attention having been given to causes and degree of deterioration and actual shrinkage as influenced by moisture content, soundness, and climatic conditions. It has been determined that excessive moisture is the most dangerous factor in handling commercial grain and that the artificial drying of corn increases its keeping qualities. Milling and baking investigations and grain-dockage investigations have been prosecuted vigorously.

Among the most important experiments being carried on at this time are tests to determine the effect on grade and the commercial and feeding values resulting from the artificial bleaching or "sulphuring" of oats. Satisfactory cooperation with grain-carrying railroads, commercial grain exchanges, grain dealers' associations, grain elevator companies, etc., has been had throughout the year, and this has contributed largely to the success of the work.

Since the organization of this investigation in 1906 an enormous amount of work has been done, including many special experiments and the testing of approximately 100,000 samples of grain. On arrival at European ports 183 cargoes of American corn have been examined, and the results of the examinations have been published, while 9 cargoes of export grain have been accompanied from the United States to foreign ports and observations and tests made of them. Sufficient data are now available to establish standard grades for corn.

DEVELOPMENT OF THE BEET-SUGAR INDUSTRY.

The beet-sugar industry has practically grown up during the period covered by this report. There are now in operation 66 factories in 17 States, which required and used for the past season 5,062,333 tons of beets from 473,877 acres. It is estimated that the output of sugar from these factories the present year will be close to 700,000 tons, the largest yield in the history of the industry in this country.

The department has demonstrated the applicability of the American soil and climate to this crop and has shown the benefits that have accrued to our agriculture from its establishment. The most favorable localities have been pointed out, the growers given instructions for caring for their beets, and the general progress of the industry fostered.

The diseases of the sugar beet have been studied and the causes of a number of them have been worked out and satisfactory remedies suggested.

The production of American sugar-beet seed has been an aim of the department for years. It has been demonstrated that seed of good quality can be produced here, American strains have been bred, and the commercial production of beet seed is now in sight. In connection with this work field laboratories have been established with analytical and other facilities and experiments with cultural methods have been carried on, particularly in the irrigated districts of the West.

Much has been done to improve farm practices there and to put beet culture on a permanent and rational basis. In conclusion, it is safe to say that the beet-sugar industry is now one of the mainstays and chief supports of agriculture under irrigation in this country.

PROGRESS IN PLANT PHYSIOLOGY AND PATHOLOGY.

As indicated at the outset of this statement regarding the work of the Bureau of Plant Industry, one of the fundamental lines of work which the present Secretary had in mind was a study of the diseases of crops, with a view to outlining specific remedies for the same. Much progress has been made in this work not only so far as the department is concerned but throughout the country as a whole. The plant pathological work of the department is now on a firm foundation. Our leading pathologists have developed lines of work which have been epoch making in their nature.

PROBLEMS IN PLANT PATHOLOGY.

The cause of the crown-gall of plants has been determined, and it has been discovered that this disease resembles animal cancer in its manner of growth and is due to bacteria lodged inside certain of the proliferating cells.

It has been proved that infection of Stewart's bacterial disease of sweet corn is produced by means of seed corn; that the black rot of crucifers, the brown rot of potatoes, the wilt of cucurbits, and other bacterial diseases are distributed by insects and slugs; that tobacco wilt is spread by nematodes; that bacterial infection can take place through stomata in the absence of wounds, as in the case of the black spot of plum, a disease of sweet corn and broom corn, and other plant diseases; that acid canes are resistant to the bacterial disease of sugar cane; that many bacteria, including *Bacillus typhosus*, are readily destroyed by freezing; that the Granville tobacco wilt is identical with the bacterial brown rot of potato, eggplant, and tomato, and hence these plants should not be used in rotation.

The cause and remedy of the olive tubercle disease, coconut bud rot, bacterial mulberry blight, and a new knot disease of citrus trees have been discovered.

It has been shown that the cause of a large part of potato rot is due to *Bacillus phytophthorus*, and that the rot is arrested in tubers stored below 8° C.

FOREST PATHOLOGY.

A general pathological survey of the National Forests has been made as a preliminary to active investigational work. Extensive experiments have been inaugurated for controlling forest diseases by the improvement of forest hygiene, chiefly by the method of eliminating trees affected with dangerous diseases at the time of timber sales.

Very valuable results have been secured in the control of diseases of forest nursery stock. The leaf blight of young conifers has been shown to be readily controlled by slight modifications of prevailing nursery practice, particularly in connection with irrigation. The damping-off of forest-tree seedlings has been controlled by the use of soil fungicides, particularly by sulphuric acid. The white-pine blister rust has been destroyed wherever found, and the work on this disease has been largely responsible for the passage of the present plant quarantine act, which should prevent its further introduction.

Cooperation is in effect with 11 States in the investigation and control of the chestnut-tree bark disease, the most destructive of all tree diseases, and the work of checking its progress through methods worked out by this department is being vigorously prosecuted.

One important branch of the forest pathological work is the study and control of the diseases of shade and ornamental trees and shrubs. There is a great and growing demand from the general public for information in regard to such diseases.

DISEASES OF FRUITS.

The effective control of pear blight, one of the most serious diseases affecting pomaceous fruits, has been accomplished through eradication methods and has resulted in the saving of millions of dollars to pear orchardists on the Pacific coast and in other parts of the country.

Apple bitter-rot, a disease which has been responsible for immense losses to apple growers, has been shown to be easily and completely controlled by proper spraying with Bordeaux mixture.

A number of other apple diseases, such as scab, leaf-spot, powdery mildew, and blotch, have also been successfully controlled by spraying. Partial control of apple cedar-rust has been accomplished by cutting down the cedars and by spraying.

With the exception of bitter-rot, it has been found preferable to spray for the early treatments of apple diseases with lime-sulphur solution, using Bordeaux mixture for the later treatments. This practice has resulted in less russeting of apples from copper poisoning and has not reduced the effectiveness of the treatment.

Investigations have been carried on in connection with a number of physiological diseases of fruits, particularly of the apple, including apple bitter-pit, a disease producing corky spots in the Ben Davis and York Imperial apples, and the Jonathan fruit-spot. In the latter the trouble has been remedied by early picking and prompt storage.

The problem in connection with peach diseases has been to find a spray solution that would not injure the peach foliage. This has been brought about by the discovery of the self-boiled lime-sulphur solution, which has been demonstrated to be an effective remedy for the control of the destructive brown-rot and also of peach scab. A disastrous blight of peaches in California, due to a gumming fungus, has also been brought under control by late fall or early winter spraying with fungicides.

A number of serious fungous diseases of the cranberry have been investigated and effective methods of control devised. A satisfactory method for the treatment of grape anthracnose, a very destructive malady of both fruit and vine, has been demonstrated, and a remedy for black-rot perfected. Among the nut diseases, a remedy for pecan scab by spraying has been worked out.

A serious contagious disease belonging to the peach-yellows group, known as "little peach," has been discovered and described and a practical method of control by eradication developed. This was at one time a dangerous disease in the Michigan, New York, and New Jersey peach belts.

The fruit pathological work has been strengthened through the institution of thorough, systematic spraying demonstrations in orchards and vineyards in various parts of the country. In this manner methods of treatment of fruit diseases have been brought home to the farmer and the value of our research discoveries has been greatly increased.

DISEASES OF COTTON, TRUCK CROPS, AND SUGAR BEETS.

The cause of a group of destructive wilt diseases of cotton, cowpea, watermelon, tomato, and other plants in the Southern States has been found to be root and stem infecting fungi (*Fusarium* spp.) and a practicable method of control developed through selection and the breeding of disease-resistant varieties.

Advances have been made in our knowledge of the cause and control of a number of potato diseases, the most serious of which is potato wilt, causing premature ripening followed by dry-rot in storage. Methods of treatment for blackleg and early and late blight have also been determined, and the cause ascertained of leaf-roll, a destructive disease of potatoes in the West.

The asparagus-rust problem has been solved by breeding resistant varieties. Truck growers have been shown, by spraying demonstrations, how to control the destructive blights of cucumbers, cantaloupes, celery, and other crops, and how to manage their soils to escape malnutrition troubles and at the same time to produce more crops with less fertilizer. A general investigation has been made of dry-rot, stem-rot, and other diseases of sweet potatoes, and remedial measures have been recommended. Tobacco root-rot, tomato wilt and rot, a number of ginseng diseases, and the whole group of nematode diseases have been studied critically and control measures introduced.

Leaf-spot and curly-top, two important diseases of sugar beets, have been thoroughly investigated, and better methods for combating them have been pointed out. Similar work has been done in connection with the damping-off and root-rot of sugar beets.

SOIL-BACTERIOLOGY AND PLANT-NUTRITION INVESTIGATIONS.

Satisfactory methods for isolating and distributing nitrogen-fixing bacteria for improving leguminous crops by inoculating the seed or the soil were discovered. Tests in cooperation with thousands of farmers throughout the United States have shown that such crops as clover, alfalfa, vetch, peas, and beans are often doubled or trebled in value by pure-culture inoculation. During the past five years the efficiency of the cultures distributed to farmers has been approximately 75 per cent.

The copper-sulphate method for destroying objectionable algæ in city water supplies without lowering the safety of the supply has been discovered and practically demonstrated. This method has become standard practice in sanitary engineering and is recommended by the leading sanitary experts. It was found that copper sulphate could be used in water supplies as an agent for killing dangerous germs, such as those causing cholera and typhoid. Simple directions for improving farm water supplies have also been formulated.

Extensive bacteriological studies to explain the variation in soil fertility have been undertaken, and during the past year the classical ideas regarding the decomposition of cellulose, which is considered a fundamental substance in humus formation, have been found to be erroneous. Many new and important species of soil bacteria that dissolve cellulose are under investigation, which are expected to make possible more suitable farm practices for maintaining soil humus.

WORK ON DRUG PLANTS.

It has been shown that many valuable drug and related crops can be successfully grown in favorable regions throughout the country. The culture of golden-seal and paprika peppers has been successfully established. Camphor culture has been introduced in Florida, with results sufficiently promising to attract private capital on an extensive scale.

The culture of American tea has been introduced in a demonstration experiment now yielding an annual crop of 14,000 to 16,000 pounds of high-grade tea, all of which finds a ready market in competition with imported teas.

Hop investigations have been productive of valuable results in demonstrating the causes of failure to produce the best returns in yield and quality, and have also led to the recommendation of rational criteria for judging hops on the basis of their properties and constituents rather than their geographic origin, with the hope of removing certain forms of discrimination now made against American hops in the trade. Improved foreign varieties are being introduced and progress made in the improvement of the yield and quality of American hops.

Studies of oil and perfumery plants have included the planting of 40 varieties of roses of imported types yielding the valuable rose oil of commerce and the development of good commercial values from raisin-seed waste and other oil-yielding residues, as well as from a number of neglected plants. In this connection a new turpentine substitute and a new linseed-oil substitute have been demonstrated.

POISONOUS-PLANT STUDIES.

Loco weeds, larkspur, wild lupine, death camas, and other poisonous plants have been responsible for enormous losses of stock in the grazing regions of the West. These losses have been greatly reduced through botanical surveys, and field and laboratory tests of suspected plants, so that it has been possible to point out the harmful plants, to recommend methods of avoiding poisonous-plant areas at the most dangerous period of growth, and to devise and indicate methods of treatment, antidoting, etc.

PLANT PHYSIOLOGICAL INVESTIGATIONS.

Advances in agricultural science have necessitated the broadening of the work in physiological investigations to meet the demands for fundamental knowledge of plant activities. The following are some of the results of these studies: An accurate method for measuring the oxidase content of plant juices, which has particular application in determining physiological phenomena accompanying many types of plant diseases; increased knowledge of the physiological conditions affecting the keeping qualities of sweet potatoes in storage and a consequent avoidance of the heavy annual losses from their rapid deterioration; a better understanding of the inorganic food requirements of plants and of the influence on plant development of various ratios of these inorganic constituents; and additional light upon existing confusion as to the toxicity of certain molds occurring in spoiled foods and the harmlessness of others of the same group, as the result of a study of the metabolism of molds and of the conditions under which they elaborate toxic products.

PROGRESS IN DEMONSTRATION WORK.

COOPERATIVE DEMONSTRATION WORK IN THE SOUTH.

The demonstration idea has been a feature of the work of the Bureau of Plant Industry since its organization. Even before the plant work was coordinated, demonstrations were a necessary adjunct to research work on plant diseases, notably those of the grape and the potato. Early in 1903 the advent of the cotton boll weevil in the South made it imperative that steps be taken to meet its ravages through some cooperative effort on the part of the farmers.

Out of the various preliminary steps that must necessarily be taken in a work of this nature there developed a few years later the Farmers' Cooperative Demonstration Work. Briefly stated, the object of this work was to bring home to the farmer on his own farm certain fundamentals which would enable him to grow cotton despite the weevil, and also to point the way for him to diversify his crops and build up his land. It was found essential that the farmer should be taught self-reliance and to help himself in so far as related to the practices of the farm. Any effort made to help the farmer by mere object lessons in which he did not actively participate was found to be a failure.

As the work progressed the demand for it rapidly increased. At the close of the fiscal year 1906 there were employed 25 agents having under their supervision more than 2,000 demonstration farms, and in addition more than 3,500 cooperators were receiving instructions from the department. The demand now arose for more intensified work. Each field agent's territory included several counties, and he could at most personally supervise not more than three or four demonstration farms located near the principal railroad centers in each county. In several counties business men and leading farmers now offered to contribute toward the salary of an agent to devote his entire time to their county. In the season of 1907 such cooperative plans were arranged for a county agent in six counties in eastern Texas and two in western Louisiana. The results in such counties were so satisfactory that the county agent was henceforth considered a necessary addition to the plan of organization. Since that time no material change has been made in the plan, which includes a special agent in charge, with a staff of assistants and a clerical force, a State agent, and from two to four district agents in each State, and generally a county or local agent in each county in the State.

It is not too much to say that this work has revolutionized the agriculture of the Southern States. It has given the farmers a new outlook and has shown them the great possibilities of the land. The scope of the work has been gradually enlarged from simple demonstrations in cotton culture to a comprehensive system of instruction in general agriculture, including the organization of boys' corn clubs and girls' canning clubs.

The extensive growth of this work from its small beginning may be appreciated from the fact that at the end of the fiscal year 1912 the force of agents conducting demonstration work in the field was 858; something like 35,000 farmers were enrolled as demonstrators and about 67,000 additional farmers were listed as cooperators in the department's methods. Enrolled in the boys' corn clubs were approximately 68,000 boys, and in the girls' canning clubs 20,000 girls. From its inception the work has been on a cooperative basis. Merchants and business men supplied seed and fertilizer for the cotton-culture farms, even during the earliest years of the work, and farmers did the work. With the growth of the plan of supplying local or county agents, business men and commercial bodies, in order to secure the services of such local or county agents in their counties, began to assist in paying their salaries. Cooperative relationships have been established with agricultural colleges, boards of agriculture, and county organizations.

The department is now spending something like $600,000 annually in the work throughout the Southern States, about half of which is appropriated by the Government, while the other half is contributed by State and private agencies. It is believed that the permanency of the demonstration work on the southern farms is assured, as its efficiency has been thoroughly tested under various conditions; it is attracting wide attention, and the plan is being rapidly adopted by agricultural colleges, business organizations, railroads, and other agencies doing propaganda work. Within recent years representatives from many foreign countries have been sent into the South to study the practical workings and efficiency of the system.

FARM-MANAGEMENT INVESTIGATIONS.

Early in the development of the work of the Bureau of Plant Industry it was seen that some coordinating agency was necessary to bring together and apply to the individual farm the results of many special lines of investigation under way. Growing out of this need was developed the Office of Farm Management, which was established eight or nine years ago. The work of this office began with a detailed study of the methods and practices actually in use on various farms of the country. Special attention was given to the study of those farms that were most successful for the purpose of comparing them with those less successful, the object being to learn the reason of success in one case and of failure in the other under similar circumstances.

This work, at first more or less general in character, has developed into a detailed study not only of methods and practices generally in use, but also a study of farm organization and the coordination of related enterprises on the farm into such a system as will give the greatest return from the farm. Some of the special lines now in operation are as follows:

Farm bookkeeping.—Because of the importance of adequate methods of keeping the accounts of the farm a great deal of attention has been given to this subject. The results to date have just been published in Farmers' Bulletin 511, entitled "Farm Bookkeeping."

Cost accounting.—This is a study of the actual cost of operations on the farm and over 100 farms are now cooperating in keeping the actual time spent in the smallest details of every operation performed on the farm.

Farm-management surveys.—Farm to farm surveys of typical agricultural areas are being made to determine what returns are being received for capital and labor on the average farm of each type. At the present time the records of about 4,000 farms have been gathered, some of which have already been published, while others are being tabulated and prepared for publication.

Farm equipment.—A detailed study of the equipment of the farm is being made on a large number of farms for the purpose of learning what is an adequate equipment for farms of various types.

FARM-MANAGEMENT FIELD STUDIES AND DEMONSTRATIONS.

The result of the investigations of the past few years is that a vast fund of information has accumulated which the farmer needs and which he is entitled to have. The means of getting this information to the farmer in such a way that everyone may understand it has been the cause of considerable thought on the part of those who have charge of the work. Bulletins have been issued, but for various reasons failed to reach the farmers as effectively as had been hoped. Later, demonstration farms were established with a view to bringing into each community as an object lesson a farm properly equipped and managed. This plan also fell short of what was expected of it. Later, the plan of placing in each county or local area agricultural agents, whose services would be free to every farmer in the locality, has been established and is rapidly developing. The duties of the county agent are as follows:

> To acquaint himself as rapidly as possible with the general agricultural conditions of the locality, study the various types of soils, the crops that have been found to be best adapted, and the types of farming that have been most successful on each type of soil.

To spend his entire time in the interests of improved farming in the section, studying the methods and practices of the most successful farmers who are following the various types of farming; to visit the farmers on their farms, study their plans, and aid them in formulating better plans.

To study every phase of all the farms he visits, so that he may know what methods, crops, and systems are best for the locality, and at all times, wherever he goes, to give the farmers the benefit of the information he gets, including the results of scientific investigations conducted by the various experiment stations and the United States Department of Agriculture relating to all kinds of farm practice.

The first of these county agencies was established in Bedford County, Pa., three years ago. Agricultural conditions were at a low ebb. Reports for the past season show that 8,000 acres of corn have been grown by improved cultural methods and the use of selected seed, with an average increased yield of 5 bushels per acre; 6,400 acres of clover from inoculated northern seed; 1,500 acres of soy beans, a crop wholly unknown before this work started; 200 acres of rape for hog pasture, replacing either grass pasture or none; and 300 acres of alfalfa. No attention had ever been given to the apple crop before this work began. The orchards were neglected. Now the trees are being pruned and sprayed under the agent's direction, and the fruit is carefully graded, packed, and shipped under label. This affords an instance of where a latent industry may be developed under this plan. The value of the results of improved methods in this county for the past season is not less than $135,000.

The next county agent was located in Broome County, N. Y. In this case the Binghamton Chamber of Commerce and the Delaware, Lackawanna & Western Railroad are cooperating financially toward the work, which is directed jointly by the New York State College of Agriculture and this department.

This method of cooperation with business organizations has met with general approval, and the demand for this work is far beyond the ability of the department to meet. At the last session of Congress $300,000 was appropriated for this work. There are now about 75 county agents in various parts of the country, and others will be established as fast as means and competent men can be had.

The methods of cooperation here mentioned are similar to many that have since been established. In every case the work in the State is conducted in cooperation with the agricultural college or experiment station, either with or without aid from other organizations.

ENTOMOLOGY.

EXTRAORDINARY GROWTH OF SERVICE.

Sixteen years ago the entomological service of the department was ranked as a division, and it had on its rolls 21 employees; the statutory roll amounted to $9,500 per annum, and the lump fund to be spent for investigations was $20,000.

At the present time the service ranks as a bureau and carries more than 500 employees upon its rolls. The amount paid for statutory salaries is $58,750 per annum, and the total annual appropriation is $672,340.

Sixteen years ago the work was entirely carried on in three or four rooms in the city of Washington; members of the force visited the field from time to time, but there were no field stations.

At the present time the bulk of the work is done far away from Washington. The bureau has 35 field laboratories scattered all over the United States, and nearly all of them admirably fitted for sound investigation work upon certain particular insects or groups of insects most advantageously to be studied at the individual stations.

It may reasonably be supposed that the extraordinary growth of the service, just as with other branches of the department, has been facilitated by Congress upon recognition of the practical results achieved by the work which has been done. Some of the good work carried on may be mentioned briefly.

IMPORTATIONS OF INJURIOUS INSECTS.

Just 16 years ago the bureau began to study with extreme care the question of the accidental introduction, by means of commerce, of injurious insects from other countries. It was realized that about one-half of the injurious species of first-class importance had been so introduced, and in consequence not only was begun the study of other species likely to be imported, but a quarantine and inspection bill was drafted and put before Congress from time to time from 1897 down to the Congress of the winter of 1911–12. Passage of an act of this character was warmly urged by the department during all those years, and the passage of such a law by the last Congress is a measure which will undoubtedly prove of great benefit to the country.

SAN JOSE SCALE.

During the early part of this 16-year period the San Jose scale, which had recently made its appearance in the East and threatened the destruction of eastern orchards, was carefully investigated by the bureau, and its final report on the life history of this destructive scale has remained as a standard. Later the country of origin was discovered by an employee of the bureau, Mr. Marlatt, and from that country (China) he sent over a predatory enemy of the scale, which was reared in confinement at Washington and subsequently liberated in orchards in different parts of the country.

It is true that the success of the lime-sulphur wash as a winter treatment for this scale has obviated the necessity for a competent natural enemy to a large extent, but it is believed that this enemy is still living in parts of the South.

MEXICAN COTTON BOLL WEEVIL.

The Mexican cotton boll weevil received some attention at the hands of the department prior to the 16-year period under consideration. At that time it was confined to the State of Texas, and, inasmuch as the State itself appropriated a sum of money for its investigation, to be carried on by the State entomologist, the department turned the matter over to the station authorities for a time.

In 1900, however, it appeared that the problem was so great as to demand every possible aid, and, with congressional appropriations, the entomological service of the department entered once more upon the investigation and has continued it until the present time. In the course of this investigation probably the most intensive study ever made has been carried out in regard to the boll weevil. Every phase of its life history and activities has been gone into with the utmost particularity.

As the result of these intensive studies, while no actual and radical remedy of an exterminative character has been found, a system of cotton-plantation management has been developed, based entirely on these studies, which enables the planter to grow good crops even in the presence of the weevil. This has been put into effect with great success by the southern farm demonstration service of the Bureau of Plant Industry. Incidentally other insect enemies of cotton have been studied during these investigations.

FIG WASP.

Following the sending to California from Algeria by Mr. Swingle, of the Bureau of Plant Industry, of the fig wasp (*Blastophaga grossorum*), this insect, upon whose relations with the flowers of the Smyrna fig the production of the Smyrna fig crop is dependent, was established in California under the management of an agent of the Bureau of Entomology, and this establishment is responsible for the present Smyrna fig culture in that State and of its future culture in other States.

GIPSY MOTH AND BROWN-TAIL MOTH.

The gipsy moth and the brown-tail moth, two insects accidentally introduced into New England, became so abundant and destructive in 1905 as to call not only for large State appropriations but for governmental aid. Realizing the hopelessness of exterminative work after these pests had gained a firm foothold over 4,000 square miles of territory, Congress appropriated to the department a sum of money to be used in the effort to prevent the spread of both gipsy moth and brown-tail moth.

During the years in which this appropriation has been made, the bureau and the different States acting in cooperation have succeeded in preventing any extensive spread and in making the conditions of the towns and villages within the infested territory perfectly livable, whereas previously both species had been enormously destructive and very annoying.

During that period further extensive importations of the parasites and natural enemies of the gipsy moth have been made from Europe and from Japan, and of the brown-tail moth from different parts of Europe. Very many species have been imported in great quantities, and a number of them have been established in New England territory. The effect of their work is being more strongly seen each year, and it is hoped that they will shortly become so numerous as to be important factors in holding the destructive insects in check.

Recent discoveries have been made which promise, by observing certain principles in forest management, to result in the preservation of good stands of timber in the New England forests in spite of the continued presence of these tree pests.

OTHER NOXIOUS INSECTS.

The introduction of the parasites and natural enemies of the gipsy moth and brown-tail moth is not the only work of this kind done by the bureau. An important enemy of the black scale of the orange and olive has been introduced, an egg parasite of the elm-leaf beetle as well, and at present the bureau is engaged in importing the European parasites of the alfalfa weevil. Similar shipments of American parasites to foreign Governments have also been made, and the most striking success has been achieved in the sending of a minute parasite of the mulberry scale from the United States to Italy, where it is reported to have been of the greatest benefit in the destruction of the scales, which bred so numerously in the mulberry plantations as to threaten the entire destruction of this tree upon which is based the great silk-growing industry of that country.

A few years ago a thrips appeared upon pear trees and other deciduous fruit trees in central California, completely blasting the crops and spreading rapidly, threatening the destruction of practically all deciduous fruits on the Pacific coast. After two years' investigation of the method of life of this pest, the bureau discovered perfectly competent remedies, by the use of which orchardists are once more growing their normal crops.

Three years ago a weevil destructive to the alfalfa was discovered in the vicinity of Salt Lake City. It has spread rather rapidly to the north and to the east, and appeared to threaten great danger to this vitally important crop of the irrigated regions of the West. The bureau's experts have been studying it since the beginning, have been engaged in importing its natural enemies from Europe (it is a European insect), and have now discovered a method by which the pest can be handled after the first crop of alfalfa has been harvested. It is hoped that in time some other means will be discovered whereby the important first crop can be saved.

INSECTS AS CARRIERS OF DISEASES.

Throughout the entire 16 years the important subject of the carriage of diseases of man and animals by insects has been investigated. The mosquitoes that carry malaria and yellow fever have been carefully studied, and publications have been issued warning people and giving remedies.

In the same way the relation of the common house fly to the carriage of typhoid fever and other intestinal diseases has been studied, and in the same way publications of warning have been issued, and these have given remedies.

The tick which carries the Rocky Mountain spotted fever has also been studied, and an investigation has been completed which points out a way to control this dangerous creature.

The ticks that carry the Texas fever of cattle have also been made the subject of intensive study, and many facts have been ascertained which are of service to the Bureau of Animal Industry in its large-scale work in pushing the quarantine line against southern cattle farther and farther to the south.

FUMIGATING CITRUS TREES.

The process of fumigating citrus trees with hydrocyanic-acid gas, which was carried on at a very great expense by the prosperous owners of citrus groves in southern California a few years ago, has been studied with the utmost care, and as a result the expense of the process has been reduced to a remarkable degree. A single grower has stated that the result of this work has saved him a quarter of a million dollars.

INSECTS INJURIOUS TO TREES.

Facts determined within the past 10 years indicate quite conclusively that 7 species of bark beetles of the genus Dendroctonus. injurious to coniferous trees, have killed more merchantable pine, spruce, and Douglas fir timber in this country than has been killed in the same period by forest fires. Investigations by the bureau have resulted in the gaining of a very complete knowledge of these injurious species and in ascertaining methods of control. The success of these methods of control has been demonstrated many times. Extensive depredations in Colorado, South Dakota, Montana, Oregon, and California by one of these beetles have been successfully controlled in localities where cooperative demonstration work has been carried on at a cost conforming to profitable business methods.

In 1910 and 1911 an outbreak of the southern pine beetle, which 20 years before had devastated the pine forests of West Virginia and Virginia, threatened a like fate to the pine timber of the South Atlantic and Gulf States, but practical demonstrations by representatives of the bureau and the adoption by the owners of the timber of the methods recommended resulted in the cutting of millions of cords of wood from the infested trees, which was burned for fuel, thus destroying the broods of the beetles in the bark. This has contributed to the almost complete control of the beetle and to the saving of one of the principal natural resources of the South.

The officials of Federal, State, municipal, and private reservations, as well as private owners of forest and wood lots, are beginning to avail themselves of this information, so that, as a direct result of the investigations of the department, these beetles will be eliminated as an important factor in forest destruction.

DEMONSTRATION WORK.

Demonstration work, such as is mentioned in the previous paragraph, has come to be an important function of the bureau, and such work has been carried on against the codling moth in different parts of the country, against the pear thrips in California, against the grape rootworm in Pennsylvania, against the cotton boll weevil in Texas, against the cattle tick in Texas, against the plum curculio in Georgia, and against other insects in other parts of the country. There seems to be a great difference between the results of telling people how to do things and showing them how to do them.

COOPERATION WITH OTHER AGENCIES.

In the course of the work there has been much cooperation with State experiment stations and with other organizations. For example, the bureau has cooperated with Massachusetts in the work on the gipsy moth parasites, in the general moth work, and in the inspection work; with Montana on the spotted fever, with Louisiana on the Argentine ant, with Texas on cotton insects other than the boll weevil, with California on the subject of scale parasites, with Tennessee on tobacco insects, with South Carolina on the red spider and other cotton insects, with Indiana and Kansas on forage-crop insects, with Utah on the alfalfa weevil, with Hawaii on the Mediterranean fruit-fly, with Wisconsin on cranberry insects, and with many others.

LIFE HISTORIES OF INSECTS.

During the 16 years the complete life histories of many hundreds of species of injurious insects have been worked out, and the publications of the service during that period cover in competent form practically all of the principal crop pests of the United States.

SOIL INVESTIGATIONS.

FEARS OF SOIL EXHAUSTION.

For the fiscal year 1897 there was appropriated for the Division of Soils $15,300, while for the year 1912 the appropriation for the Bureau of Soils was $262,060. In the former period the work was 3 years old, and the foundation for subsequent development was still being laid.

For 60 years the scientists of the world had wrestled with Liebig's mineral theory of plant food without progressing much beyond the limits of his classical work. No practical or efficient basis of classification of soils had been worked out, the adaptation of crops to soils was not appreciated, there was no rational theory of fertilization, no specific knowledge of how fertilizers act upon the soil or plant, and no efficient methods of determining the manurial requirements of a soil.

Moreover, our people have always been an adventurous people; the country sparsely settled and new in experience and tradition. Methods of culture and crop rotation adapted to the different soils were little understood or considered of minor importance. The impression was general that the soils of the country were wearing out with ever-decreasing productivity, and alarm was felt for the future of our increasing population and the possibility of the ultimate exhaustion of our soils and of the natural deposits of fertilizer materials, which it was claimed were essential for the maintenance of the proper mineral composition of agricultural lands.

These are subjects that are at the very foundation of the Nation's prosperity, and are matters that I have had deeply at heart during my term of service.

THE SOIL AN INDESTRUCTIBLE ASSET.

As a result of the profound investigation in the Bureau of Soils of reported cases of soil exhaustion, it appears that all such cases are due principally to mismanagement of tillage operations, to the lack of proper adaptation of soils and crops, to the unwise rotation of crops, and to the misuse of fertilizers and manures, making it a personal failure rather than a natural and fundamental deterioration of the soil. It can be said, therefore, that the soil is the one indestructible asset of the Nation, which can be vastly improved by better and intensive methods or which can be temporarily impaired by wrong usage.

This conclusion was reached through a mineralogical study of soils and rocks, the study of the solubility of soil minerals and of the composition of the soil solution, the study of the profound changes taking place in the soil constantly through the mixing of soil grains by erosion, winds, and internal movements, and in the soil constituents through the action of percolating and capillary waters, the study of the increasing yield of farm crops during the 40 years for which records have been kept in this country, a study of the much larger increases in yields on the older soils of Europe during the past 300 years, and by a comparison of the chemical composition of the relatively new soils of this country and the relatively older agricultural soils of Europe.

SOIL SURVEYS.

Admitting that the productivity of our many important soils depends in the long run upon the knowledge and skill of our people in handling each type according to its specific needs, the importance and significance of the bureau's work in the classification and mapping of soils can be more fully appreciated.

During the last 12 years soil surveys have been made of 622,595 square miles, or an area practically as large as the combined areas of Germany, France, Great Britain, Ireland, and Italy. In this work the soils are classified according to their origin and constitution, and the reports discuss their characteristics, their principal tillage requirements, and their crop adaptations. Omitting the sparsely settled Rocky Mountain region, the Northwest Intermountain region, the arid Southwest, and the Great Basin, the survey has covered 29.2 per cent of the land surface of the United States, giving a complete classification of the soils, showing their area and distribution within the limits of the surveys, and indicating in a general way the localities outside of the areas surveyed where the different soil types may be expected to be found.

ADAPTATION OF SOILS.

During the progress of this work and through supplemental investigations, the special adaptation of many of these types of soils to crops has been worked out, and we have definitely established the cause of many failures in farming to be the attempt to produce crops on soils to which they are not adapted and upon which a high degree of commercial success can not be expected.

Conversely, we have a knowledge of soils that are peculiarly adapted to certain crops and others which should be used for certain crops when increasing density of population and market and transportation facilities justify their most intensive use.

Examples of such knowledge acquired through the soil survey might be multiplied indefinitely. As a result of the soil survey of the Connecticut Valley in 1899, possibilities of introducing the Sumatra type of tobacco wrapper leaf were pointed out on certain soils of that locality, and since then an industry has been established where a very fine textured leaf is produced, under the most intensive cultivation, which sells for as much as $2 a pound, as against 20 to 30 cents a pound for the leaf previously grown, and the industry has now become one of considerable magnitude and importance.

In the soil of the Nacogdoches area, Texas, the similarity of certain soils there with the soils of the Vuelta Abajo district of Cuba was noticed, and as a result of field experiments put out by the bureau it was found that the Cuban tobacco seed produced on certain types of soils the fine aroma of the leaf grown in Cuba.

MALADAPTATION.

The soil survey has shown that not over 5 per cent of the soils adapted to winter and spring vegetables are now being devoted to these valuable crops, the remaining 95 per cent being little used, as they have little value for general farm crops and are not needed at present for the crops for which they are adapted.

In the development of this industry in the future there will be no excuse for the mistakes that have been made in the past, as the relation of every type of truck soil to the variety of truck crop to which it is best adapted is now well understood, and the location of these soil types is known.

Similarly, the vast opportunities for the safe development of fruit and of dairy industries so far as they are dependent upon the soil and climatic conditions and cultural treatment are now assured, if one but takes advantage of the work that has been done by the Department of Agriculture.

The much-dreaded injury from alkali in the soils of the dry regions of the West no longer need exist, as the Bureau of Soils has located and accurately mapped the alkali soils, so far as they have been encountered in the survey, has studied the type of alkali in each district, and has shown that it can be controlled and eliminated from serious consideration by practicable methods of soil management.

Through laboratory research it has been found that not only do soil types differ in their relation to crops but that they differ also in the effect left by these crops which influences succeeding crops, and that for the highest development of the soil crops must succeed crops in a certain general order, which order of rotation is dependent upon the nature of the soil as well as upon climatic conditions and cultural treatment.

COMMERCIAL FERTILIZERS.

The subject of the use of commercial fertilizers, which has developed to so large proportions in the last 50 years, has also been investigated by the bureau, and it has been found that they have very important functions in addition to their value as mineral plant foods.

The soil is not static, as was formerly supposed, but is dynamic, with many functions continually at work producing changes and always mutually affecting one another, and these changes can also be profoundly influenced by the substances ordinarily used as soil amendments.

It has further been shown that the United States has within its borders ample supplies of the raw materials which experience has proved to be most useful as fertilizers to supply the Nation's needs for an indefinite period into the future.

There is in this country enough high-grade phosphate rock to supply three times the present demands for 12 centuries or more. The giant kelps of the Pacific coast and Alaska, if properly conserved and cropped on scientific principles, can probably surpass in yield of potash salts the famous Stassfurt mines, and there is reason to expect that commercial production of potash from feldspar will soon be a reality. With many sources of nitrogen carriers yet to be utilized to their fullest extent and with practicable methods of "fixing" atmospheric nitrogen already finding a home in this country, the future may be faced with equanimity so far as problems of supply are concerned.

All of the results of fertilizer experiments that have been made and published in this country have been summarized in a series of bulletins, which, together with the laboratory investigations now going on, will ultimately, it is believed, lay the foundation for a rational system of fertilization.

FUTURE PRODUCTIVITY.

With intelligence and care in the cultivation of the lands already under agricultural occupation and in the taking up of idle lands with increasing density of population, it is estimated that the soils of this country will be in about the same state of development as the soils of France and Germany, and that they will produce many times as much as they do to-day.

ANIMAL INDUSTRY.

MANY NEW LINES OF WORK.

The work relating to the live-stock industry, which includes not only fostering the interests of those engaged in production but helping the consumers of the country to obtain a supply of wholesome animal food, such as meat, milk, and eggs, has been greatly enlarged during the 16 years under review. Prior to 1897 the work of the Bureau of Animal Industry related almost entirely to diseases of animals, meat inspection, etc., and very scant attention was given to such important things as animal husbandry and dairying.

ANIMAL HUSBANDRY.

BEGINNINGS.

Animal husbandry as a separate branch of the Bureau of Animal Industry at Washington was first recognized on July 1, 1901, when an expert in animal husbandry was appointed. In 1904 a specific appropriation for such work was requested, and Congress appropriated $25,000 for cooperative experiments in animal feeding and breeding, to be spent during the fiscal year 1905. The animal husbandry work began to be informally designated the "Animal Husbandry Office" about this time, and was formally designated the "Animal Husbandry Division" by the Secretary's order on January 1, 1910.

HORSE BREEDING.

The Animal Husbandry Division started the revival of interest in the breeding of Morgan horses. In cooperation with the Colorado Experiment Station the division is demonstrating that the utility characteristics of the American trotter, to which frequent attention has been called by show-ring performances, can be perpetuated by proper selection.

It has brought about a complete reversal in the procedure of importing animals into the United States for breeding purposes, and now a man in the horse-importing business must not only import a pedigree certificate, but a horse as well whose description agrees with that outlined in the certificate.

INFERTILE EGGS.

It has shown that by producing infertile eggs the keeping quality of eggs can be greatly improved and millions of dollars in losses from bad eggs can be saved. At its instigation and with the cordial cooperation of local authorities, the egg trade of Kansas was placed on a quality basis in a single year. Other States have followed the example set in Kansas.

BEEF PRODUCTION IN THE SOUTH.

In cooperation with the Alabama Experiment Station it is being demonstrated that beef can be produced cheaply in the South. The results of eight years' investigation show that the South, east of the Mississippi River, is the territory to which the people of the United States must look in future for reasonably cheap beef.

SHEEP.

In Wyoming sheep husbandry is being studied to determine the most profitable types and lines of breeding on the range. In Vermont a Southdown flock of high quality is kept.

ANIMAL NUTRITION.

In cooperation with the Pennsylvania State College the most complete apparatus in the world has been built for the study of the nutrition of domestic animals. The beginning of this work antedates by three years the inauguration of animal husbandry work at Washington.

MILITARY HORSES.

In the current appropriations act, for the first time in the history of the United States, Congress has recognized the fact that to insure a sufficient supply of suitable horses for military purposes Government aid is necessary. The Government proposes to furnish the stallions but the farmers will breed the remounts. Work will begin without delay, and American farmers will therefore have a share in the national defense.

WORK RELATING TO THE DAIRY INDUSTRY.

The Dairy Division of the Bureau of Animal Industry was organized July 1, 1895, with four employees, and up to 1897 its work consisted of compiling and publishing data relative to conditions of the dairy industry and the methods most approved at that time. All the experimental and extension work has been done since March, 1897.

EXPORT BUTTER.

In 1897 experimental shipments of butter to foreign markets were begun. For several years the development of foreign markets for dairy products in Europe, West Indies, and Asia constituted a large part of the division's activity.

INCREASING THE PRODUCTION OF MILK AND BUTTER FAT.

Census figures show that the average production of milk and butter fat per cow in the United States is entirely too low. A large proportion of the cows do not produce enough to pay for their feed at market prices. By better selection of cows and better methods of feeding it is possible to increase considerably the average production, which would mean not only the placing of dairy farming on a profitable basis but a more plentiful supply of an important class of food products. Work in this direction has been carried on for several years, and the results are becoming apparent.

DAIRYING IN THE SOUTH AND FAR WEST.

Field work for the development and improvement of dairy farming was begun in 1905 with a survey of conditions in the South. That section then had scarcely any dairying, but stood in urgent need of its beneficial effects. Cooperative relations were entered into with State authorities and field work has been carried on in Alabama, Mississippi, Tennessee, North Carolina, South Carolina, Georgia, Kentucky, Maryland, Virginia, Louisiana, and Texas. The people and authorities of the States have become very much interested and are now bearing a large part of the expenses of the work. Dairying has now come to be of considerable importance. Wherever one farmer has been induced to adopt improved equipment and methods the influence of his example has spread in all the surrounding community.

In 1910 similar work was taken up in the Far West in regions where dairying is an entirely new business—beef cattle, sheep, and wheat growing having hitherto received the chief consideration. Field men are at work in Colorado, Idaho, North Dakota, and Utah.

COW-TESTING ASSOCIATIONS.

Cow-testing associations, or cooperative clubs for recording the feed and production of the individual cows, are an important means of bringing about increased production of milk and butter fat, and for the past five years work has been carried on for the promotion of these associations. The associations organized number 118, of which 97 are active, with 39,000 cows tested yearly. The records of a Michigan association show that in four years there has been a marked increase in the average production of milk and butter fat per cow, while the average annual profit has been practically doubled.

Another promising line of work just started is the organization of bull associations, or clubs for the cooperative purchase and use of carefully selected purebred bulls, with a view to improving the breeding of dairy herds.

Much investigational work has been conducted with barns, silos, and feeds. The introduction of the popular concrete silo is largely the work of the Dairy Division.

MARKET MILK.

Work for the improvement of market milk was undertaken in 1905. Attention at first was given only to the sanitary aspects of dairy-farm conditions. Later the product was followed all the way to the city, even into the consumer's ice box, and attention is now being given also to the economics of the subject. A great factor in milk improvement has been the introduction of the score-card system of inspection. Under this system dairy farms, city milk plants, grocery stores, and even the milk and cream are graded according to a numerical valuation of the various elements involved, the total of the score card giving a good comparative idea of the place or thing scored. At the present time over 170 cities are using a score card for inspection, and the milk supply of 22,000,000 people is thereby safeguarded. The efficiency of official inspection has been greatly enhanced, infant mortality has been reduced, and adult health has been bettered. The score card has been translated into French for use in Canada.

This work for the improvement of the milk supply is done largely in cooperation with State dairy commissioners and State and city boards of health. These agencies look to the department for leadership, expert advice, and up-to-date information.

Beginning in 1908 competitive exhibitions of milk and cream have been held under the auspices of the Dairy Division in various cities. Samples are exhibited and scored, and lectures and addresses are given. These exhibitions have educated both dairymen and consumers.

CREAMERIES AND CHEESE FACTORIES.

Manufacturing enterprises such as creameries and cheese factories are an important part of the dairy industry and have received special attention during the past six years. This work consists of investigations, demonstrations, and cooperative work in the organization and management of creameries and cheese factories, including market conditions and methods, sanitary condition of creameries, and quality of cream; investigations in the manufacture of ice cream, condensed milk, and desiccated milk; and the inspection of renovated-butter factories and materials.

Demonstration work in creamery management is done under the supervision of expert creamery operators, who take temporary charge of creameries and show how to organize properly the routine work and apply improved methods of management. It is expected that this work will result in showing the necessity for more efficient creamery management, also in an improvement in the quantity and quality of butter made. The loss from lack of these things is now estimated at from seven to eight million dollars a year.

STORED BUTTER.

Great improvement in the quality of stored butter has been made possible by investigations in the manufacture and storage of sweet-cream butter. Butter made from pasteurized sweet cream without the use of a starter, and sealed in tin cans, will keep from 8 to 10 months in storage with but very little deterioration in quality and with practically no development of objectionable flavors, while butter made in the old way from sour, unpasteurized cream is of inferior quality and shows considerable deterioration after storage. These conclusions are based on the results obtained in the manufacture of over 2,000,000 pounds of butter during the last three years.

QUALITY OF CREAM.

Investigation of the quality of cream used in making creamery butter and the sanitary condition of creameries is expected to reveal the true cause of the poor quality of much of the butter now being made. This work is done by men who are practical creamery operators. They visit the creameries and carefully examine the sanitary conditions. They determine the temperature, acid content, age, and grade of cream and the methods used in its production and care before delivery to the creamery. It has been estimated that less than 10 per cent of the butter made is of first quality, and it seems probable that when the cause is known a remedy may be suggested.

RENOVATED-BUTTER INSPECTION.

A great deal of butter after becoming rancid is sent to factories to be "renovated" or made fit for food and again placed on the market. Under a law passed in 1902 an inspection of these plants and of their materials and products is maintained. This work has resulted in improving the sanitary condition of the plants making renovated butter, a more careful selection of the materials used, and the proper marking of packages to show that the product is "renovated" or "process" butter, and thus prevents deception of the purchaser. This butter when made under good sanitary conditions and from proper stock is wholesome, though not equal in quality to high-grade creamery butter. When sold on its own merits, its sale is perfectly legitimate.

LABORATORY WORK ON DAIRY PROBLEMS.

Since 1902 laboratory work on dairy problems has been carried on, and at the present time there are 25 people in the Dairy Division laboratories engaged in research work covering nearly all branches of the dairy industry.

The most notable results so far obtained from the laboratory work are, briefly: The determination of the influence of the breed, the individuality of the animal, and the period of lactation on the composition of the milk; a study of the bacteria surviving pasteurization, and the discovery that certain types of lactic acid bacteria are sufficiently resistant to heat to withstand the temperature of pasteurization, showing that properly pasteurized milk will sour normally; the exact determination of the changes produced in milk by the heat of pasteurization, showing that certain objections to pasteurization are unfounded; the determination of the bacteria and fungi concerned in the ripening of Camembert cheese, and the establishment of methods of making this type of cheese in this country; the discovery that certain types of bacteria hitherto unobserved in Cheddar cheese attain large numbers during the ripening period, and are probably concerned in the production of the flavors; the development of a method whereby cheese of a uniform quality can be made from pasteurized milk; the establishment of the fact that the ordinary off flavors of butter are caused, not by microorganisms, but by spontaneous chemical changes, some of which are induced or accelerated by the acidity of the cream and the presence of iron or copper salts, and in which oxygen inclosed in the butter takes a part. As a result of this latter work it has been demonstrated that butter can be made which will retain its sweet flavor in storage for many months.

Among the new pieces of apparatus developed in the laboratory are one of the first tests for moisture in butter, an improved type of lactometer, a simple butter color standard, a method and apparatus for determining fat in butter, and a humidistat.

MEAT INSPECTION.

In 1897 the Government meat inspection was carried on under the law of 1891, which provided only for the inspection of animals before and at the time of slaughter and gave no authority to control sanitation, to supervise the various processes of curing, canning, and preparing meats, or to prevent adulteration or the use of harmful preservatives. The funds available for the inspection were insufficient for carrying on even the ante-mortem and post-mortem inspection at all establishments doing interstate business.

The new law, which was passed in 1906, remedied these defects and increased the powers of the inspectors, and made a permanent annual appropriation of $3,000,000, so that it may now be truly said that all the different processes in the preparation of meats and meat food products from the "hoof to the can" are carefully supervised by the department and that this inspection and the sanitary condition of the establishments are maintained at a higher standard than that of any other nation.

STATISTICS OF OPERATIONS.

The number of animals which received Federal inspection at the time of slaughter increased from 26,500,000 in 1897 to over 59,000,000 in 1912. The number of carcasses condemned increased during the same period from 67,000 to over 203,000 and the number of parts of carcasses condemned at slaughter increased from 39,000 to 464,000. In 1907 the inspection was conducted at 128 establishments in 33 cities and towns and in 1912 it covered 847 establishments in 238 cities and towns.

The following data show some of the operations of the Federal meat inspection for the last six years during which the new law has been in effect:

Animals inspected at slaughter, over	321,000,000
Carcasses condemned, over	900,000
Parts of carcasses condemned, over	4,500,000
Meat and meat food products:	
Pounds reinspected in their various preparations, over	37,000,000,000
Pounds condemned on reinspection, over	140,000,000
Pounds exported under certificates, over	7,000,000,000
Veterinary inspectors and assistants, over	2,400

In addition to the 847 establishments where Federal inspection is continuously maintained, the establishments of more than 2,000 retail butchers and dealers, who hold certificates of exemption that they may make interstate shipments of meats to their customers, are inspected as to sanitary conditions and the wholesomeness of the products they handle.

The high character of the Federal meat inspection has had the effect of greatly stimulating sentiment for the establishment of abattoirs under State or municipal control and for establishing an efficient State or municipal inspection of meats intended for purely local consumption.

INSPECTION AND QUARANTINE OF IMPORTED ANIMALS.

For many years the department has maintained a system of inspection and quarantine of imported animals for the purpose of protecting the live stock of this country against contagious diseases which prevail in other parts of the world, and which would do tremendous damage if they should gain entrance in this country. In 1897 there were three animal quarantine stations on the Atlantic seaboard, all of which were but poorly equipped and on rented land located near the ports of Boston, New York, and Baltimore.

At present the department has three well-equipped animal quarantine stations for these ports, the land as well as equipment in each case being owned by the Government. Excellent accommodations are provided for animals subject to quarantine.

The present regulations require, in brief, that all horses, cattle, sheep, and other ruminants and swine must be inspected before they are admitted, and, in addition, that all ruminants and swine from any part of the world except North America shall be quarantined. Nearly all the animals admitted on inspection without quarantine come from Canada and Mexico, and consist mainly of cattle and sheep for feeding and slaughter and horses, mules, etc., for work purposes, although some animals from Canada are imported for dairy and breeding purposes. Nearly all the live stock brought from across the seas are pure-bred animals for breeding purposes. During the past five years about a million and a quarter animals have been imported under this system of inspection and quarantine.

EXCLUSION OF DISEASES.

Owing to the existence of communicable diseases of animals among the live stock of various parts of the world, importations from over seas have been mainly restricted to Great Britain, Ireland, and the Channel Islands. It is required that a permit be procured from the Secretary of Agriculture prior to the shipment from countries other than North America of cattle, sheep, and other ruminants and swine for their landing subject to inspection and for their detention in quarantine at one of the Federal stations.

During this period of 16 years surra reached our shores in an importation of Brahman cattle from India, but was promptly stamped out in quarantine. Also Malta fever was discovered in a herd of goats from the island of Malta and was likewise eradicated by the slaughter of the affected animals before there was any opportunity for the disease to extend to other animals.

Foot-and-mouth disease has during the above period twice appeared in this country, but has in each instance been promptly eradicated. The infection was introduced in contaminated vaccine imported by manufacturers of biological products, and in neither case was the disease introduced through the medium of products over which this department maintains supervision.

INSPECTION OF LIVE STOCK FOR EXPORT.

Animals intended for export are given a veterinary inspection by the Bureau of Animal Industry in order to guard against the exportation of any that may be affected with disease and to conform to the requirements of certain foreign Governments. This inspection thus serves to maintain a good reputation for American live stock in foreign markets and to keep open markets that would otherwise be closed against us.

Our largest exports of cattle are to Great Britain. Considerable numbers of cattle, sheep, horses, and mules are also inspected for export to Canada, and when required by the Canadian regulations the cattle are tested with tuberculin for the detection of tuberculosis, and equine animals with mallein for the detection of glanders.

During the past five years the bureau has made over two and a half million inspections of animals for export. This number includes duplicate inspections of many animals inspected first at interior points, such as Chicago and Buffalo, and again at the ports of export, such as New York and Boston. The actual number of animals inspected was over a million and three-quarters. In this number there were nearly 300,000 Canadian animals shipped through the United States in transit to other countries, mainly Great Britain. The tuberculin test was applied to over 2,200 cattle and the mallein test to about 34,000 horses and mules.

Our exports of meat animals have decreased in recent years because of the heavy demand and high prices of the home market. The United States exports comparatively few live animals to Continental Europe, mainly because our stock is excluded by the policy of some of the European Governments.

OCEAN VESSELS.

Besides inspecting live stock for export, the bureau inspects the ocean vessels that carry such animals, and enforces regulations as to fittings, feed, water, attendants, etc., so as to insure that the animals will be carried in a safe and humane manner and reach the other side in good condition. In the five years mentioned 2,733 inspections of vessels were thus made.

On arrival at the principal British ports the animals are again inspected by the representatives of the Bureau of Animal Industry stationed there, as well as by the British authorities. Statistics show that the losses of live stock in ocean transit, which were formerly quite heavy, have been reduced to a negligible point under the bureau's supervision, and insurance rates have been correspondingly decreased.

STAMPING OUT DISEASES OF ANIMALS.

In suppressing and eradicating infectious diseases of live stock the Bureau of Animal Industry has been especially successful, and this work has saved the country from losses and damage that would otherwise have run into untold millions of dollars. To appreciate the effective work in our own country we must compare conditions here with those in other parts of the world where destructive animal diseases play havoc with the live stock. Even Europe, with its well-organized and efficient government forces, is overrun with foot-and-mouth disease and other infectious diseases, and in spite of a continual struggle at great expense and with heavy losses the diseases persist. Fortunately in the United States we have kept out some of the worst diseases, and when foot-and-mouth disease and pleuropneumonia have gained entrance they have been stamped out by vigorous work before the infection had spread to such an extent as to place us in the unfortunate position of some of the European countries.

FOOT-AND-MOUTH DISEASE.

Since 1897 the bureau has twice been called upon to deal with outbreaks of foot-and-mouth disease of foreign origin, first in Massachusetts and adjoining States in 1902–3, and then in New York, Pennsylvania, Maryland, and Minnesota in 1908. Fortunately, the bureau was already equipped with a capable staff and organization, and each time the disease was promptly eradicated after a few months of vigorous effort, with the cooperation of State authorities.

The means used were strict quarantine, careful inspection, the slaughter of all diseased and exposed animals, and the disinfection of premises. Had it been necessary to lose time in getting together an organized force, and had the force been less capable, the infection would in all probability have extended to the great cattle-raising regions of the West, where it would have caused tremendous damage and where its eradication would have been much more difficult if not impossible.

The energy and promptness with which the second of these outbreaks was stamped out led an intelligent old farmer who had observed some of the work to express his commendation of the department's efficiency. He said that ours is a great Government, as shown by the fact that when a strange malady of an intensely infectious nature, capable of inflicting widespread and serious loss to live-stock owners, struck many herds over a wide area of territory, there appeared at once with the energy and promptness of a city fire department a Government force of veterinarians trained to cope with the disease, whose vigorous measures suppressed it completely almost before the people of the community had time to realize the gravity of the situation. And he remarked again that it was indeed a wonderful Government which was prepared to meet so unusual an emergency and to meet it in such manner.

TEXAS FEVER.

The department has also undertaken to rid the United States of certain diseases which have long existed here and which have been a heavy handicap to the stock-raising interests. All this work has been begun and carried on within the past 16 years, and the progress and results so far attained have more than justified the expense. The three diseases against which our administrative efforts have been chiefly directed are Texas fever of cattle, sheep scab, and cattle mange.

The boundary of the area infected with Texas fever was located by the department between the years 1882 and 1885, and since that time a quarantine has been maintained, and there have been restrictions on the movement of cattle from the quarantined area so as to prevent the spread of the disease. The discovery that the tick is the carrier and disseminator of Texas fever was made by scientists of the Bureau of Animal Industry in 1890, and the eradication of the tick has long been believed to be possible. No systematic effort, however, to eradicate these ticks was undertaken until 1906. In that year Congress made an appropriation for this purpose, and the work was begun in cooperation with authorities of the affected States.

When it was first proposed to undertake the extermination of the Texas-fever ticks this was regarded by many as an impossible task, but it was soon proven to be not only possible but practicable. Since the work was begun in 1906 about 165,000 square miles have been freed of the ticks and released from quarantine. This is equal to more than the combined areas of Georgia, Alabama, and Mississippi, and is nearly one-fourth of the total area infected at the time of beginning the work.

The objects of eradicating the ticks and thereby stamping out the disease are to give the cattle owners of the quarantined area an unrestricted market for their cattle, thereby enabling them to obtain better prices; to prevent the losses due to the tick as a transmitter of disease and also as a simple parasite; to increase the number and improve the quality of cattle in the South; to increase the fertility of the soil by promoting cattle raising, and to improve agricultural conditions generally. The losses due to the cattle tick are conservatively estimated at from $60,000,000 to $100,000,000 a year.

The eradication of cattle ticks is an important step in the agricultural regeneration of the South. The presence of this parasite has been a great handicap to cattle raising there, but with the tick out of the way the fine natural advantages of that section for cattle raising will enable the southern farmers to build up a profitable industry and add greatly to the country's beef supply, which is now running short. The eradication of the tick is also important for the development of the dairy industry.

SHEEP SCAB.

In 1899, owing to complaints from England that American sheep shipped to that country were frequently found to be infected with scabies, the department issued the first order relating to interstate shipments of sheep affected with that disease. Federal inspectors were placed at the principal feeding points of all the railroads leading to market centers with instructions to inspect all shipments of sheep, and if any were found affected with scabies to supervise their dipping and treatment or allow them to proceed to a point where they could be dipped under Federal supervision. Later on this inspection of sheep was extended to the points at which the sheep originated and were accepted for interstate movement.

While this plan reduced the trouble and was more satisfactory to the sheep growers and transportation companies than the stock-yards inspection, still it did not eradicate the disease on the range to the extent that was hoped for. Accordingly, in 1904 a Federal quarantine was placed on all the territory west of the eastern border of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas, which included an area of 1,853,811 square miles. A plan of cooperation was arranged by the Department of Agriculture with the sheep sanitary commissions of several States providing for the inspection of all sheep and the proper treating of all flocks of sheep found to be affected with or exposed to disease. This plan was found to be very effectual and was taken up by other States as soon as State laws could be obtained under which the department could cooperate.

As a result of work under this plan a large area was in 1907 released from Federal quarantine on account of the nonexistence of disease, and from that time until the present there has been released an area comprising 1,171,590 square miles. This leaves only 682,221 square miles still in quarantine, and in this area sheep scabies exists to a very slight extent. As illustrative of this point it may be stated that when the eradication work was first taken up in New Mexico, in the spring of 1907, 48 per cent of the 4,500,000 sheep in that State were diseased. As a result of State and Federal cooperation and the annual dipping under Federal supervision of all sheep within the State, the inspection of sheep in the spring of 1912 showed the existence of less than 1 per cent of disease.

Contrary to predictions made by many woolgrowers, sheep scabies has within the last 10 years been practically eliminated from the United States, and as a result the sheep industry is in a very much more prosperous condition than when a heavy loss in the product of wool and mutton was each year experienced as the result of sheep scabies.

CATTLE MANGE.

In 1904 it became evident to the department that cattle scabies or mange existed quite extensively in the United States, especially in the territory west of the Missouri River and east of the Rocky Mountains. Accordingly, regulations tending toward the control and eradication of the disease were promulgated, and the areas where cattle scabies was known to exist to the greatest extent were placed under Federal quarantine. This included an area covering about 452,632 square miles in several Western States.

As in the work of eradicating sheep scabies, Federal and State cooperation was resorted to, with the result that since 1907 cattle scabies has been successfully controlled and 218,572 square miles of territory released from quarantine

While the area released from quarantine seems to show that the work is only half accomplished, this does not express the real progress made. As the extent to which disease exists in the territory still remaining in quarantine has been so greatly reduced, it will only be a short time until cattle scabies in the United States will be a matter of history.

BOVINE TUBERCULOSIS.

In 1907 the Bureau of Animal Industry first undertook to cooperate actively with individual herd owners and State and city officials in the eradication of bovine tuberculosis from dairy herds. In the first year 658 cattle were tested, of which 118, or 17.9 per cent, gave reactions indicating the presence of tuberculosis. These tests were applied only to cattle whose owners signed an agreement with the bureau providing for the slaughter or efficient quarantine of reactors, the tuberculin testing of animals added to the herd, the disinfection of infected premises, and the observation of proper sanitary measures. This work has grown in popularity until in 1912 cattle tested numbered 8,433, of which 769 were reactors or suspects. The percentage of tuberculosis now being found by annual retests in this territory has thus been reduced to 2.30 per cent. During the period covered 25,193 cattle have been tested.

In the fall of 1909 special cooperation in the eradication of bovine tuberculosis was given in the District of Columbia. In the first complete testing of the District cattle a total of 1,701 cattle were tested, of which 321, or 18.87 per cent, were tuberculous. A systematic retesting has reduced the percentage to 1.29, and in the meantime the testing of cattle entering from other States has prevented the introduction of diseased animals.

This cooperative work has been extended into various States which desired the assistance of the bureau in dealing with the bovine tuberculosis problem. The tuberculin test is also applied to cattle for breeding or dairy purposes for interstate shipment.

The effects of this work are well illustrated by the marked reduction in the prevalence of tuberculosis in the herds of cattle which are being maintained under bureau supervision. These results have been so satisfactory to the cattle owners that requests for cooperation far in excess of what can be done with the present force are constantly being received from the individual owners, as well as from city and State officials.

SCIENTIFIC INVESTIGATIONS OF ANIMAL DISEASES.

Scientific knowledge of the causes and nature of animal diseases and their relation to human health is a necessary basis for administrative work in dealing effectively with such diseases. In the domain of scientific research the Bureau of Animal Industry has had a large share in the advancement of knowledge. The investigations of this kind have been carried on by the Pathological, Biochemic, and Zoological Divisions, and the Experiment Station.

THE CATTLE TICK.

Although some excellent results were obtained prior to 1897, the energies of the scientific staff were centered upon the study of only a few diseases. The country had but recently been freed from infectious pleuropneumonia of cattle, and as Texas fever was apparently the most serious animal disease existing at that time, much attention was devoted to the study of its cause and prevention. The later work relating to this disease has included the determination of the shortest and longest periods of time in the development, at all stages, in the life history of the Southern cattle tick, the carrier of Texas fever of cattle; the determination that apparently healthy southern cattle may continue to carry the parasite that causes Texas fever in their blood for years after they have been removed from the so-called infected territory and have been protected against all sources of infection, and the determination that noninfectious cattle ticks become infectious and capable of causing Texas fever by living a single generation on the bodies of southern cattle that have been kept half a dozen years or longer in apparently perfect health north of the Texas fever territory, and away from all sources of infection. These results form a series of contributions of the greatest importance in the practical work of the eradication of southern cattle ticks and the prevention of Texas fever.

The efficacy of arsenical dips as remedies for destroying cattle ticks and the proper strengths of the dipping solutions have been proved and determined by careful and prolonged investigations. Without an efficacious remedy like the arsenical dip, progress in tick eradication would be extremely difficult if not practically impossible.

BLACKLEG VACCINE.

The extensive losses of young cattle from blackleg, together with the perfection of a protective vaccine by Kitt and other European investigators, led to the inauguration in 1897 of the manufacture and distribution of blackleg vaccine by the department. In the past 15 years more than 17,000,000 doses of this vaccine have been distributed to stock raisers. In regions where blackleg prevailed the losses formerly amounted to more than 10 per cent of the annual calf crop, but by the use of the vaccine the losses have been reduced to less than 0.5 per cent of vaccinated cattle.

TUBERCLE BACILLI.

The rapid increase of cases of tuberculosis among the animals slaughtered in the various packing houses of the country demanded the careful study of the many questions which were connected with this insidious disease. Consequently the presence of tubercle bacilli in the milk of cows that reacted to the tuberculin test but without showing any clinical indications of the disease was investigated by means of very extensive experiments.

The transmissibility and the transformability of the human, bovine, and avian types of tubercle bacilli was made the subject of study; also the different methods of immunization; the retention of vitality by tubercle bacilli that chance to be lodged in cheese, butter, or eggs; and the occurrence of the different types of tubercle bacilli in cases of natural infection of birds and animals in captivity.

Other investigations on tuberculosis have thrown much light on the relation between the location of tuberculous lesions in the animal body and the channels through which tubercle bacilli are expelled and disseminated from the bodies of tuberculous animals; on the persistence of the life and virulence of tubercle bacilli under different conditions and in different media; on the relation between tuberculosis of lower animals and human beings; on the relation between tuberculosis of cattle and tuberculosis among other species of animals; on the persistence of tubercle bacilli in a latent or semilatent state, without loss of virulence, in the tissues of living animals; on the causes that are responsible for the increased frequency of tuberculosis among hogs, etc.

The practical significance of some of this work is shown, for example, by the widespread interest taken in those studies on the elimination and dissemination of tubercle bacilli by tuberculous animals, which led to the discovery that tubercle bacilli are of common occurrence in the feces of even apparently healthy tuberculous cattle. This discovery at once offered an explanation for the occurrence of tubercle bacilli in the milk of tuberculous cows with healthy udders, and made it possible to prove definitely that the feces of tuberculous cattle are a common cause of tuberculosis among hogs.

HOG CHOLERA.

For many years the Bureau of Animal Industry carried on a systematic study concerning the cause of hog cholera. These investigations culminated in 1903 in the discovery that this fatal disease is caused by a microorganism of such minute size that even the most powerful microscopes do not enable us to determine its form or structure. This discovery of the true cause of hog cholera enabled the department's investigators to attack the problem of prevention with intelligence and with some prospect of success.

Following the discovery of the true cause of hog cholera, the bureau succeeded in producing a protective serum from immune hogs which serves to prevent an attack of hog cholera in animals which would certainly succumb except for the serum inoculation. This antihog-cholera serum has been patented and assigned to the free use of the people of the United States. It has been found that this serum can be produced at a cost sufficiently low to warrant its employment in practice.

The department, through bulletins and other special notices, has advised all the States of the Union of this discovery and has urged them to undertake the manufacture of this serum for the benefit of farmers. At the present time 28 States have done more or less work along this line, and more than 1,000,000 hogs have been given the protective inoculation with most satisfactory results.

In order to understand what the discovery of this serum may mean to the people of this country, we need merely to consider that the value of property in swine in the United States exceeds $500,000,000, and that a conservative estimate shows that the average yearly loss from hog cholera must amount to more than $18,000,000.

The investigations of the department have thus placed the people of the country in a position to save all, or a greater part, of this loss and, furthermore, as the serum may be used to prevent hog cholera, farmers should soon be in a position to raise greatly increased numbers of hogs without being deterred, as they are now, by the fear of this destructive disease.

GLANDERS AND OTHER DISEASES.

The diagnosis of glanders, Malta fever, dourine, and infectious abortion by the application of complement-fixation tests to the blood serum is one of the recent achievements that has a far-reaching importance. By this method it is now possible to diagnose these diseases accurately and promptly. This is a great improvement over the uncertainty of former methods. About 2,500 complement-fixation tests were made during the past year.

Infectious abortion is a scourge of the cattle industry at the present day, and has been a subject of special investigation during the past two years. With prevention in view very extensive experiments have been made for the purpose of discovering some effective and practicable method of immunizing exposed animals against this disease.

The demonstration of the occurrence of the bacillus of infectious abortion in market milk, of its continued elimination with milk by cows that have aborted, and that it causes well-marked, characteristic lesions in small experiment animals, may throw much light on the important question of infectious abortion among animals, and has added another argument to the many that have been discovered in recent years in favor of the general pasteurization of the public milk supply, as it is not yet known in what relation the abortion bacillus, which can affect many species of animals, may stand to human health.

INVESTIGATING LOSSES OF SHEEP.

Losses of sheep on the ranges of the West, through eating poisonous or narcotic plants such as the loco weed, and also from the diseases known as bighead and necrobacillosis, have been very heavy. The causes of these losses are being investigated by men of the Bureau of Animal Industry who have been detailed to the affected regions in order that they may study the outbreaks as they really occur.

DISEASES OF HORSES.

Another matter which receives attention in the midst of the affected area is swamp fever of horses, which occurs most seriously in the lowlands of the river bottoms in the northern prairie States. Forage poisoning of horses in the Middle West, as well as in several of the Atlantic States, has for several years proved to be a baffling and destructive disease and has received careful study, both in the field and in the laboratory. Dourine among horses has suddenly appeared on three or four occasions and has demanded prompt attention because of its contagious character.

RABIES OF DOGS AND OTHER ANIMALS.

The supply of dogs and other animals affected with rabies seems to be inexhaustible, and it is therefore necessary to make examinations of suspected material without any cessation. It is safe to say that many human lives have been saved through prompt and accurate diagnosis in the case of animals that had bitten people, the persons thus being informed when it was advisable for them to resort to the Pasteur treatment to prevent the development of hydrophobia.

Diseases of fowls and of pet stock are very important and are so frequently referred to the bureau that one or more men are kept constantly employed in dealing with them.

SPECIFIC REMEDIES.

Bacterins, antitoxins, and numerous biological products for the prevention or treatment of various animal diseases are being placed upon the market in great profusion, and it has become necessary that some supervision should be placed over these preparations, as the chance for marketing fraudulent, worthless articles is so attractive to the unscrupulous that certain men are availing themselves of the offered opportunity for reaping a harvest. A beginning has been made in standardizing these products, and the value of all such products should be determined before they are placed on sale before the public.

For many years the bureau has furnished free of charge to official veterinarians, health officers, etc., tuberculin for the diagnosis of tuberculosis in cattle and mallein for the diagnosis of glanders in horses. In 1897 there were so furnished 7,000 doses of tuberculin and 1,400 of mallein. In 1912 the quantity of tuberculin amounted to 329,000 doses and mallein 135,000 doses. During the 16 years approximately 2,000,000 doses of tuberculin and 500,000 doses of mallein were supplied to State, county, and municipal officials. The tuberculin distributed has been used almost exclusively for testing dairy cattle for tuberculosis. The distribution by the department has enabled State officials to secure this reliable diagnostic agent promptly upon request, and they have employed it in various campaigns to remove tuberculous animals from dairy herds.

There are, of course, some dairy herds which are free of tuberculosis; there are others which are badly infected. The average percentage of tuberculous animals in dairy herds, as shown by these tests, extending over the past 16 years, is little if any below 5 per cent. It is certainly true that in most cases where tuberculous animals have been discovered by this test steps have been taken to remove the danger which they presented. It must therefore be assumed that this distribution of tuberculin has resulted in the removal from dairy herds of not far from 100,000 infected animals. The removal of these animals, of course, is of great importance to the public health and is also of economic importance on account of the menace to the health of the other animals in the herd.

Antigens for use in the various complement-fixation tests and precipitating sera for use in the diagnosis of glanders, Malta fever, anthrax, etc., have been prepared and furnished ready for use to laboratory workers in various States of the Union. In this class of materials may be included a bacterin preparation for the treatment of the buffaloes in the Yellowstone Park, which have been decimated by attacks of hemorrhagic septicemia.

A supply of stock cultures comprising many of the pathogenic organisms commonly producing disease in animals are kept constantly in cultivation and are at all times available for supplying scientists who desire to cultivate a collection of bacteria and for schools that need them for study and comparison.

ANIMAL PARASITES.

Some important work has been done with regard to animal parasites and parasitic diseases. The Zoological Division has worked out the life history of the stomach worm of sheep, a parasite which entails a loss of millions of dollars annually to the sheep industry of this country. This loss may be avoided or minimized only by the adoption of preventive and remedial measures based upon a knowledge of the life history of the parasite.

The presence of the gid parasite of sheep in the United States was discovered. The importance of eradicating this parasite has been pointed out, and a careful watch is kept for new centers of infection in order that more stringent measures may be taken in case the parasite should show a tendency to spread beyond its present restricted limits of distribution.

The common occurrence of a tapeworm cyst in the muscles of sheep has also been discovered. Investigations have shown that this cyst is the intermediate stage of a dog tapeworm, hence not dangerous to man. The presence of these cysts in mutton, however, renders it undesirable as food, and a considerable loss thus results to the meat supply of the country.

A common stomach worm of the horse has been found to be transmitted by the house fly. The infection passes from the manure of infested horses to fly larvæ breeding in the manure, and the full-grown flies developing from these larvæ in turn transfer the parasites to horses.

The discovery of the New World hookworm of man and its extensive distribution in the United States was made by a scientist of the Bureau of Animal Industry who has since gone to another branch of the public service. His far-reaching investigations were begun before he left this department.

Numerous new species of parasites of varying degrees of economic importance have been discovered in the course of the bureau's work in parasitology, and a complete index to the extensive literature concerning parasites has been compiled and published.

BENEFICIAL RESULTS WIDELY DIFFUSED.

It can readily be seen that the activities and benefits of these scientific investigations extend into every section of the country, and that the work performed does much to check and to overcome the advance of every contagious epizootic as well as to cure the animal that is suffering from a less dangerous ailment. The lives of countless animals are preserved each year, and because of the investigations of materials which form an important part of the daily food of the people of the country, human lives are also helped and lengthened and in many instances sickness and death are prevented.

EXPERIMENTAL FARMS.

Some of the investigations require farm conditions. In 1897 the Bureau of Animal Industry had for this purpose an establishment for which the name "experiment station" was a misnomer. It was located on a rented tract of land with an area of less than 6 acres. The available buildings for housing animals and laboratory purposes were a few one-story frame structures which could be duplicated, together with their entire equipment, for about $3,000, and the duplication of which at any price, for any purpose, would be extravagant.

The experiment station is now located on a 50-acre tract of land owned by the Department of Agriculture, at Bethesda, Md. Its laboratory is a $25,000 fire-proof building, and the entire property, including buildings, roads, water, and sewage systems, etc., is worth at least $75,000. This station is used for investigations concerning diseases of animals, and is well equipped for the purpose.

The bureau also has a farm at Beltsville, Md., for investigations in animal husbandry and dairying. This farm, which was bought by the department in 1910, consists of 475 acres of land, and is being equipped for the work for which it is intended. This farm affords facilities that have long been needed, and is expected to yield valuable results to the stock-raising and dairy interests of the country.

BIOLOGICAL SURVEY.

EARLIER DUTIES.

During the past 16 years the work of the Biological Survey has been greatly enlarged and its field broadened, as is shown by a comparison of appropriations and number of employees. The appropriation for the fiscal year 1897 was $20,560, while that for 1913 was $191,400; the number of employees increased from 23 in 1897 to 97 on July 1, 1912. In 1897 the office, then known as the Division of Biological Survey, was charged with two main lines of work—investigation of the geographic distribution of mammals and birds and studies of the food habits of the useful and injurious species.

IMPORTATIONS OF LIVE BIRDS AND WILD ANIMALS.

In 1900 under the act regulating importation and interstate commerce in birds and game the survey was given supervision of all importations of live birds and wild animals. Under a system modeled after that of western Australia, and in cooperation with the Customs Service of the Treasury Department, a system of permits was carried into effect which has made it possible to trace each consignment imported from abroad, and to exclude any injurious species.

For the fiscal year ending June 30, 1912, the total number of mammals imported from abroad was 5,457, and the total number of birds 457,077. In other words, we are now importing foreign birds (chiefly cage birds) at an average rate of more than 1,000 a day, and a systematic record is kept of all such importations at each of the entry ports of the United States and in Hawaii.

No other country has undertaken so comprehensive a system to prevent the introduction of species which may become injurious to agriculture. Congress, recognizing the increased field of operations of the office, raised the division to the rank of a bureau on July 1, 1905.

DISTRIBUTION AND HABITS OF NATIVE MAMMALS AND BIRDS.

The basis of most of the work is scientific investigation, and in this field the most notable accomplishments have been the systematic collection and publication of data regarding the distribution and habits of native mammals and birds, and the preparation of maps showing the natural life zones of the country. Each of these zones is especially adapted to the growth of special crops and marks the limits within which certain varieties of fruits and cereals produce the greatest yield or beyond which they are not likely to be commercially successful.

Maps showing the ranges of individual species have also been published, and have proved useful in cooperative work with the Public Health Service in outlining the range of mammals which carry the tick responsible for the deadly spotted fever in the Bitter Root Valley, Mont., and the area occupied by the ground squirrels in California which transmit bubonic plague.

Maps have also been prepared showing the distribution of other species of ground squirrels, of pocket gophers, prairie dogs, wolves, and coyotes, all of which are extremely destructive to stock and agricultural interests in the West. The survey has mapped the ranges, determined the abundance, and studied the habits of many of the North American mammals and birds, and the knowledge thus gained makes it possible to cope with most of the economic problems in which native species are involved. Detailed studies have been made of certain regions of special interest, notably of Mount Shasta, Cal., and of the States of Colorado and Arkansas. A report has been published on the birds of Arkansas, forming the first complete list of the birds of that State ever issued. Comprehensive lists of the birds of Alabama and Texas are now in course of preparation. The latter, on account of the richness of the Texas fauna, will include more than one-half of the species known from North America north of Mexico.

FOOD HABITS OF BIRDS.

Careful studies have been made of the food habits of birds considered injurious and of many species that are known to be beneficial. More than 50 species of birds have been found to destroy the cotton boll weevil and 31 have been found to feed on the alfalfa weevil which has recently become so destructive in Utah. Special studies have been made of the food of birds in the fruit-growing districts in California and of special generally distributed groups, such as the flycatchers, grosbeaks, shore birds, and waterfowl. A summary of some of these studies, entitled "Common Birds in Relation to Agriculture," has proved one of the most popular bulletins ever issued by the department, more than half a million copies having been distributed in recent years.

SPECIES INJURIOUS TO AGRICULTURE.

Much attention has been devoted to species injurious to agriculture, and methods have been devised for destroying English sparrows, wolves, coyotes, moles, rats, ground squirrels, and prairie dogs. When it is considered that 32 prairie dogs will eat as much forage as one sheep and 250 prairie dogs as much as one cow, it can readily be seen how important is the destruction of these animals on grazing lands in the West. Even the crawfish, which are destructive in cotton fields in certain sections in Mississippi, have received attention, and methods of destroying them with bisulphide of carbon have been devised. This work has by no means been confined to experiments on a small scale. In cooperation with the Forest Service, the prairie dogs on considerable areas in the National Forests of Colorado have been poisoned, and the mice, chipmunks, and other rodents have been destroyed on seed plots and extensive tracts where the work of reforestation has been undertaken on the forests in the West.

GAME PROTECTION.

In connection with the work of game protection the Biological Survey is called upon to issue permits and inspect shipments of wild animals and birds imported alive from foreign countries; to enforce the laws relating to interstate commerce in game; to enforce the law relating to protection of birds on national bird reservations; to administer 56 bird reservations and one or two big game reservations; and to cooperate with the several States in the protection of game.

These duties, authorized by act of Congress of May 25, 1900, have considerably broadened the field of work and have brought the survey into close touch with several of the other executive departments and with most of the State fish and game commissions. Supervision of the importation of foreign birds is carried on in cooperation with the Treasury Department, and in the maintenance of the bird reservations cooperation of at least six other departments—Interior, Treasury, Justice, War, Navy, and Commerce and Labor—is occasionally necessary.

Through cooperation with game commissions and associations of the various States and through its publications the department has been able to advance the cause of game protection materially, and in some instances to mold public opinion on certain matters of general interest. The last decade has witnessed a wonderful advance in game protection in the United States, and in this movement the Biological Survey has taken a prominent part. Native species have been almost entirely eliminated from the cage-bird traffic and have been largely eliminated from the plumage sold in this country for millinery purposes. Restrictions on export and sale have greatly reduced the enormous shipments of game to market which were so common a few years ago. A system of hunting licenses has been adopted in most of the States, and the number of States which have provided game commissions intrusted with enforcement of game laws has increased from 31 in 1900 to 43 in 1912.

DIVERSIFIED DUTIES.

Under its present organization, the Biological Survey is charged with such diversified duties as investigations relating to destruction, migration, and economic relations of birds and mammals; prevention of the introduction of species injurious to agriculture; maintenance of about 60 reservations; solution of problems involving the permanent preservation of buffalo, elk, antelope, and other big game and of numerous species of birds. Recently a movement has been started to intrust the department with the supervision of the protection of migratory birds, and bills providing for this new work have been introduced in Congress and have been favorably reported by the respective committees in the House and Senate.

WEATHER BUREAU.

ENORMOUS DEVELOPMENT.

Owing to the nature of its duties, the Weather Bureau is probably the most widely known bureau of the Department of Agriculture, and as the weather enters into practically every phase of human activity the extent to which the information it collects and distributes can be used to advantage and profit is scarcely to be limited. In attempting to speak, therefore, of the extension of its benefits during the past 16 years, it is not possible to do more than to touch on the more striking features of its work.

The benefits to be derived from its forecasts, warnings, and miscellaneous reports depend largely upon the extent to which the general public has been educated in the use of the information furnished. That there has been an increase of appreciation on the part of the people of this country in this respect was fully brought out several years ago when the Weather Bureau made inquiry regarding the uses to which weather information was applied. The replies received showed numerous special applications of the information to individual pursuits and industries that had not even been suspected by the Weather Bureau.

Since 1870 the Federal Government has maintained a service having for its objects the forecasting of weather conditions throughout the United States. During the first 20 years of its development the work was conducted by the Signal Corps of the Army, but in 1891 the service was reorganized and the present Weather Bureau was established as a branch of the Department of Agriculture.

With the inauguration of the meteorological service in 1870, under the control of the War Department, there were established 25 regular observation stations. In 1896–97 this number had been increased to 131. At the present time the Weather Bureau has 193 regular stations of the first order, which take and telegraph observations twice daily.

A further general idea of the development of the service may be obtained from a comparison of the annual appropriations for its maintenance. In 1870 the Secretary of War set aside the sum of $20,000 for the first year's work in maintaining the 25 stations then established. In 1896–97 the annual appropriation for the Weather Bureau was $883,772, while the sum appropriated by Congress for the maintenance and operation of the Weather Bureau in all its ramifications during the fiscal year ending June 30, 1913, was $1,619,680.

EXTENSIONS OF OBSERVATIONS AND FORECASTS.

Prior to 1897 the forecaster had under observation twice each day the atmospheric conditions over the area comprising the United States and extreme southern Canada. At the outbreak of the Spanish-American War in 1898 the field of observations was extended to include the West Indies, where the majority of the violent tropical storms that devastate the southern coasts of the United States make their appearance. In the same year reports were received for the first time from Mexico, and in later years the establishment of a number of stations in the Rocky Mountain and plateau regions afforded much needed information to the forecaster. In 1900 the daily survey of atmospheric conditions was extended to the British isles, continental Europe, Bermuda, and the Azores, through the cooperation of the meteorological services of those countries, and in 1907 the field was further extended to include Iceland, Asia, and Alaska.

At the present time there is prepared each morning in the forecast room of the central office of the Weather Bureau a chart showing the atmospheric conditions in middle latitudes around the northern hemisphere. No other meteorological service prepares a world-wide weather map. This chart not only affords material aid in the preparation of the daily forecasts but has made possible the making of forecasts for a week in advance.

WEEKLY FORECASTS.

The weekly forecasts are given wide publicity through the press, and their accuracy has been the subject of much favorable comment. This extension of the forecast period marks the greatest advance of weather forecasting in recent years. That the enlarged survey is also an important aid in the preparation of the daily forecasts is attested by the following table, which shows the increase in the percentage of accuracy for the year ending June 30, 1912, over the year 1893:

1911						1912					
July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.
7.2	12.8	1.7	1.6	4.0	6.4	6.1	4.2	3.9	5.2	3.5	5.8

The annual percentage of verification for the 12 months ending June 30, 1912, was 88.5, or 7 per cent higher than in 1893.

USE OF THE RADIOTELEGRAPH.

During the hurricane seasons of 1910 and 1911 reports of wind, barometer, and weather conditions were received by radiotelegraph from vessels in the Gulf of Mexico and the Caribbean Sea and off the south Atlantic coast, and on two occasions these reports gave the first indications of the formation of hurricanes in those regions. This was the first successful effort to employ the radiotelegraph in weather forecasting.

The service is at present in successful operation on 50 vessels plying the Atlantic Ocean from New York to West Indian and southern ports, and the Gulf and Atlantic between New Orleans and the West Indies, and it is now reasonably certain that no hurricanes will reach our southern coasts unannounced.

A similar service has been partly inaugurated on the Pacific Ocean, where cooperating vessels make daily weather reports to the Weather Bureau officials at San Francisco and Portland, while stations in Alaska and the Aleutian Islands make daily reports of weather conditions by wireless.

There is also under consideration the extension of the field of observations to the north Atlantic steamship routes by means of radiotelegraphy, which will make possible the issue of warnings concerning weather, winds, and storms over that region for the benefit of shipping.

A still more ambitious project, growing out of the deliberations of the International Radiotelegraphic Conference, held in London, England, last June and July, has in view the taking of meteorological observations by all trans-Atlantic steamers, those taken east of the fortieth meridian to be forwarded direct to some point in Europe (London or Paris), and those taken west of that line to be sent to Washington. It has also been recommended that five vessels be equipped for the exclusive purpose of taking observations in the West Indian waters during the hurricane season from June to November, at which time the certainty of receiving daily reports will be particularly valuable in insuring the safety of vessels at sea.

STORMS OF TROPICAL ORIGIN.

Of the severe storms of tropical origin that visited the eastern and southern coasts of the United States during the last 16 years, warnings were in all cases issued in advance of their arrival. Probably the most destructive was the Galveston hurricane of September, 1900, when 6,000 lives were lost, and damage to the extent of $30,000,000 inflicted. In 1909 and 1910 severe hurricanes visited the Florida Peninsula, but owing to the accurate and timely warnings of the Weather Bureau comparatively little damage resulted. Hundreds of employees of the Florida East Coast Railway at work in exposed locations along the keys at that time, as well as barges and other movable property, were removed to places of safety as a result of warnings given by the Weather Bureau.

COLD-WAVE WARNINGS.

The warnings of those sudden and destructive temperature changes known as cold waves are probably next in importance to the storm and hurricane warnings. These warnings are issued from 24 to 36 hours in advance of the cold wave, and are often of immense value. During the severe cold wave of January 1–5, 1896, which overspread nearly the entire United States east of the Rocky Mountains, the warnings were issued 36 hours in advance and resulted in saving over $3,500,000 through the protection of property from injury or destruction.

Among the successful weekly forecasts that have been issued in recent years those of July and December, 1911, were particularly prominent. That of July successfully announced the breaking up of a hot wave that had prevailed for some time over the Eastern and Middle Western States. Again, on December 24, the weekly forecast stated that, following a prolonged period of high temperature, severe winter weather would visit the United States by the beginning of 1912. The coldest weather in years occurred in the southern plateau region, freezing temperatures were recorded in California, a cold wave of marked intensity prevailed over the Plains States and Mississippi Valley, and the change to colder was felt to the Gulf and Atlantic coasts.

DISTRIBUTION OF FORECASTS AND STORM WARNINGS.

The distribution of forecasts and of cold-wave, frost, and storm warnings, for the benefit of agriculture and commerce, and in a special way for the protection of fruit, cranberry, tobacco, sugar-cane, and other crops, has been greatly extended during the past 16 years. The following table compares the distribution to places or addresses in 1896 with that given in 1912:

Issue of forecasts and warnings.	1896	1912
At Government expense:		
Forecasts (daily)	1,581	2,059
Special warnings only	598	946
Emergency warnings	3,481	5,154
Without expense to Government:		
Mail (forecast card)	22,642	89,512
Rural delivery	----------	30,539
Telegraph and telephone	1,712	5,462,212
Railroad telegraph	3,550	451
Railroad train service	1,939	2,343
Total	35,503	5,593,216

As will be observed, the main extension has been accomplished by means of rural free delivery and telephone service. The Rural Free Delivery Service was inaugurated in 1900 through the hearty cooperation of the Post Office Department. Owing to the prosperous condition of the farming interests, the telephone is rapidly supplanting the rural card distribution. Through the cooperation of the telephone companies, the telephone has become, next to the daily newspapers, the most extensive and expeditious means of disseminating the daily weather information; by this means more than 5,000,000 telephone subscribers get the forecasts daily. Movingpicture screens are also being utilized in eight large cities for displaying the weather forecasts for the information of the general public.

The forecast distribution already described does not include that effected through the issue of the daily weather maps. In 1896 these maps were issued at 75 stations, having an annual output of more than 3,000,000 maps. At present the map is printed at 58 stations, having an annual issue of over 6,000,000 maps. The decrease in the number of stations issuing the regular station weather map has been brought about through the substitution at many points of a newspaper map, generally known as the commercial map. A map of this character was first printed at the Centennial Exposition in 1876, and in 1896 it was being published in four papers, having a combined circulation of 110,000 daily. In 1910 a plan for its issue under improved methods was brought to the attention of the press of the country, and the officials of the bureau were urged to make every effort to obtain a wide circulation of the publication by this means. At the end of four months 65 papers were publishing the map, and by the following January 100 dailies were making this an important news item. In July, 1912, the commercial map was being prepared at 91 stations and furnished to 147 daily newspapers, with an annual circulation of 985,000,000 copies.

At the beginning of 1896 there were 173 storm-warning display stations in operation. The number has gradually been increased, until in 1912 there are 619 stations displaying signals to warn mariners of approaching storms. Twenty-five of the stations also disseminate storm warnings by radiotelegraph to vessels at sea.

FROST STUDIES AND WARNINGS.

Since 1896, 89 special stations have been established in the fruit sections in connection with the study of frost formation and to assist in making more accurate forecasts and frost warnings for mountain orchard districts, cranberry marshes, the northern vineyards, and deciduous fruit sections. Prior to that time frost warnings were based on reports of general conditions only, no data from the fruit districts being available from which the influence of local conditions of topography and air drainage could be taken into account. The extension of this special warning service into new districts is shown in the following table:

Districts receiving special frost warnings.

In 1896.	In 1912.		
Florida.	North Carolina.	Utah.	Wisconsin.
Louisiana.	Florida.	California.	Ohio.
Texas.	Louisiana.	Oregon.	New Jersey.
California.	Texas.	Washington.	Massachusetts.
	Colorado.	Idaho.	

Investigations are now being carried on in the mountain orchard districts of North Carolina with a view of determining the limits of the thermal belts in the Blue Ridge Mountains. Ten orchard stations with 29 substations have been established, and it is proposed to extend the service by the establishment of 10 additional stations on other spurs of the mountains.

Under the Portland (Oreg.) district frost investigations are carried on in the Rogue River Valley, Umpqua Valley, Stuck River Valley, Yakima Valley, Snake River Valley, Boise Valley, and Hood River Valley. The official at Portland hopes to extend this service by the establishment of 4 stations in the Boise section, 2 in Hood River, 2 in Riddles, and 5 in North Yakima. In the Lewiston (Idaho) district 3 stations are in operation. The San Francisco district has 5 stations around Los Angeles and in the northern and central counties, where the annual value of the citrus-fruit interests is placed at $40,000,000. During the past year it is estimated that by the timely warnings of the bureau at least $20,000,000 worth of fruit was saved. An extension of this service by the establishment of 12 fruit district stations in the San Gabriel Valley, 2 in the Santa Clara Valley, 3 in the San Joaquin Valley, and 5 in the Sacramento and Bay Valleys has been recommended.

In the Salt Lake district experiments for the protection of fruit by means of canopies have been carried on at Provo, and stations have been established at four other places in connection with investigations looking to the protection of vegetables and alfalfa from frost. Under the Grand Junction district is the service in the Grand River and Gunnison Valleys with five stations. Four stations have been established in the Columbus (Ohio) district, and experimental work has been started for the protection of vineyards. In the Jacksonville district the frost-warning service for the protection of truckers and citrus-fruit growers has been established with four stations in operation.

The special cranberry service gives warnings of frost in the bogs of the Cape Cod (Mass.) district, where five special stations have been established under the supervision of the official at Boston; and the bogs in Wisconsin, with three stations under the supervision of the official at Chicago. A station has also been established at New Lisbon, N. J., and another at Seaview, Wash.

RIVER AND FLOOD SERVICE.

On July 1, 1897, there were 150 river stations operating under the river and flood service of the Weather Bureau. The success of the river forecasts during the great flood of 1897 created a demand for the extension of the service that has never been fully satisfied, but increases have been made gradually until at present there are about 425 river and 25 rainfall stations distributed along all except the very smallest rivers of the United States.

The river forecasts issued daily by the Weather Bureau have contributed in no small measure to the success of navigation in the great inland waterways of the country. Flood warnings are issued whenever necessary, giving specific information as to the time of arrival of floods, the highest stages expected, and the duration of the floods. This information is of the greatest value to agriculture and many other interests.

Previous to 1897 the forecasts rarely attempted to indicate the exact heights that the floods would attain, but study and investigation have resulted in constant improvement until exact flood forecasts can now be made for periods from one day to four weeks in advance. For several years the river and flood service has been engaged in the preparation of forecast schemes for all the principal river systems—in other words, in developing rules applicable to forecasting in each of the rivers, and making a permanent record of these rules for future use. Schemes of this character have already been completed for the Ohio River and its tributaries, and the study of the Mississippi River is now under way.

During the Mississippi flood of 1897 property to the value of about $15,000,000 was saved through the Weather Bureau flood warnings, and as much during the flood of 1903, while during the great flood of 1912 a saving exceeding $16,000,000 was reported. During a single flood in the Sacramento Valley of California in 1909 property to the value of $300,000 was saved through the warnings of the Weather Bureau, and similar instances are matters of frequent record. The work has kept pace with the development of the country, and its usefulness is limited only by the amount of money that Congress is willing to provide for its maintenance.

MARINE METEOROLOGICAL CHARTS.

Upon the recommendation of the Board on Wireless Telegraphy in July, 1904, and approved by the President, the ocean meteorological work and the collection of observations from vessels at sea, formerly under the Hydrographic Office, Navy Department, was transferred to the Weather Bureau. At that time 570 vessels of all nationalities were taking observations and rendering monthly reports. The number cooperating with the Weather Bureau on July 1, 1912, was 2,291.

The observations thus collected are used in the preparation of marine meteorological charts of the oceans and the Great Lakes. These charts are given free issue to vessel captains, marine interests, libraries, and other individuals or institutions interested in the marine meteorological work of the Weather Bureau.

The charts of the north Atlantic were first published in 1909, with a monthly issue of 3,000, which has since been increased to 6,000. The north Pacific issue in 1909 was 1,500, while the issue at present is 3,100; that of the south Atlantic has been increased from 1,000 to 2,230, the south Pacific issue from 1,500 to 2,250, the Indian Ocean edition from 1,800 to 2,250, and that of the Great Lakes from 1,000 to 1,200.

VESSEL-REPORTING SERVICE.

The Weather Bureau maintains vessel-reporting stations at Block Island, Cape Henry, Sand Key, Southeast Farallon Island, Point Reyes Light, North Head, Port Crescent, and Tatoosh Island, where, in addition to their meteorological duties, the officials are required to report all wrecks, marine disasters, etc., and to transmit communications between owners, underwriters, and others interested in marine matters. As an instance of the enormous volume of work of this character done at these stations, it may be mentioned that during the year 1912 the Weather Bureau station at Cape Henry, Va., reported 19,876 vessels as having passed that station.

COOPERATIVE OBSERVATIONS AND CLIMATOLOGICAL REPORTS.

It was early apparent that only a limited number of telegraphic observation stations were required for forecasting purposes. For establishing and recording the climatic conditions of the country, however, it was necessary that a much wider distribution of observation stations be provided. This gave rise to the establishment of the climatological service of the bureau, which was brought about by enlisting the cooperation of public-spirited citizens in the formation of a widespread system of observations. At first a full equipment of the few scattered stations with standard instruments was not possible, and the results obtained from many of the early observations were unsatisfactory. During the last 10 or 15 years, however, the equipment has been improved until now practically all stations are supplied with accurate and well-exposed instruments.

In the earlier years this system covered only the older settled districts, but the observation stations were gradually extended into the far western mountains and valleys, and even into the island dependencies and Alaska. At the present time no important area of the country is without the means of approximating its main climatic features.

During the past 16 years the number of cooperative stations has increased from less than 3,000 to slightly more than 4,000, practically the entire extension having been effected in the trans-Mississippi districts.

PUBLICATIONS.

With the great industrial developments of recent years has come a better knowledge of the dependence of most enterprises upon weather changes and climatological conditions. To meet the demands for information arising from a recognition of this fact it has become necessary to issue many climatological publications. Prior to about 1896 these were decidedly meager in contents, but since that time the introduction of printing facilities at a number of the more important stations has enabled the preparation of elaborate reports, which have rapidly increased in circulation with each succeeding year.

The most important of these is the Monthly Weather Review, containing statistics of weather conditions for more than 4,000 different points in the United States; the monthly edition of separates of the review now exceeds 14,000 copies.

The annual reports of the chief of bureau contain condensed summarized data for the year from all observation stations, together with charts and tables of many of the important elements.

The National Weather Bulletin summarizes the weather conditions for each week during the crop-growing season and for each month during the remainder of the year.

The snow and ice bulletins issued during the winter months indicate the protection afforded the cereals and grasses by the snow cover and furnish data regarding ice in the principal rivers and harbors of the country.

Monthly reports on the snowfall in the mountain States are issued during the winter for the benefit of irrigation and water-power interests, and daily bulletins of the weather over the great cereal and cotton-growing States during the period of growth and harvest are given wide distribution.

Lastly may be mentioned the summaries of climatological data for 106 district sections of the United States, having the data arranged in convenient form for the use of hydraulic engineers, water users, and agriculturists. Nearly 300,000 copies of these summaries have been printed in response to the numerous demands.

The total number of climatological publications and reports issued yearly now exceeds 1,000,000 copies.

INSTRUMENTAL EQUIPMENT AND APPARATUS.

At the present time more than 200 stations, maintained for regular telegraphic reports, are equipped with the instruments essential to complete meteorological observations, while a number of special stations established to carry out particular lines of research have also been supplied with the instruments essential to their work. The structural details of most of the instruments have been modified and improved from time to time, although the general type and design have remained the same.

Besides the improvement in the instrumental equipment at the regular Weather Bureau stations a good type of thermometer shelter is fast being furnished to the cooperative climatological stations, which now number 4,000, and of which 3,100 are equipped with the standard shelter, in addition to the thermometers and rain gauges used at those points.

Beginning in 1900 the equipment of storm-warning display stations has been steadily improved by the installation of steel towers and the use of high-power oil and electric lights for display of flags and night signals. More than 200 of these towers are in use at the present time.

With the beginning of aerial studies in the winter of 1895, a standard type of construction of the Hargrave box kite was perfected and has been employed without appreciable modification in the subsequent work of the bureau, as well as at a number of European observatories. The same is true in regard to a light form of meteorograph that is sent up with the kites for recording the pressure, temperature, humidity, and wind velocity. In the course of the aerial work several excellent forms of windlass were designed for winding and unwinding the steel piano wire used in the kite ascensions.

Earthquake vibrations have been recorded in a more or less complete manner at the Washington office of the Weather Bureau for many years. In 1903 a modern type of seismograph of superior design was installed. The equipment was subsequently improved by the installation of a more sensitive new type of seismograph designed and constructed in the Instrument Division, and records have been obtained of all the important earthquakes that have since occurred.

Several useful improvements in methods and devices for observing and measuring evaporation were also developed and used in connection with the special evaporation studies conducted by the Weather Bureau in 1907–1909.

Observations of the intensity of solar radiation began with the use of the Ångström pyrheliometer. An improved type of disk pyrheliometer has been developed in the Instrument Division, and this form of instrument is now being used at Mount Weather, Va.; Madison, Wis.; Lincoln, Nebr.; and Santa Fe, N. Mex.

The accuracy of anemometer records at very high wind velocities has never been completely established. This work has recently been undertaken with the aid of a large whirling machine set up at Mount Weather, Va. Through its use a test will be made of all the important types of anemometers at velocities up to and beyond 100 miles per hour.

A special structure of ornamental character was devised in 1908 for the purpose of displaying meteorological instruments and weather charts in the parks or on the streets of large cities. These kiosks, as they are called, have been installed in 37 of the larger cities of the country and have proved an excellent means of acquainting the average citizen with the way in which the Weather Bureau obtains and distributes its weather information.

EVAPORATION STUDIES.

The formation of the Salton Sea in the desert of southern California by overflow flood waters from the Colorado River afforded an exceptionally favorable opportunity for the study of the general problem of evaporation. A preliminary campaign was begun at Reno, Nev., in 1907, and an elaborate investigation followed during 1908 and 1909 at the Salton Sea, with the primary object of determining an evaporation formula that would be of general application. The results obtained were somewhat negative, indicating that, owing to differing meteorological conditions, the law of evaporation must be established independently for each separate locality. A great mass of valuable data was secured, however, and the work can not by any means be considered a failure.

FOREST AND RAINFALL INVESTIGATIONS.

The problem of the conservation of the natural resources of the country has in recent years become one of the great issues of the day. As might naturally have been expected, honest differences of opinion have arisen in connection with various phases of the question. Probably none has been the subject of more vigorous discussion than that relating to the effect of forestation or deforestation upon water supply and water control, particularly with reference to floods. As the data at hand were apparently not conclusive, the Weather Bureau and the Bureau of Forestry of the Department of Agriculture combined forces in 1910 for a thorough investigation and study of the entire problem, in the hope of arriving at results that would be accepted as authoritative; and two small and similar watersheds in the Rio Grande National Forest in southwestern Colorado were selected as offering suitable conditions for prosecuting the necessary investigations. An elaborate equipment was provided, and observations are now being taken daily over both watersheds. In 8 or 10 years it is proposed to deforest one of the watersheds and then to continue the observations over both for another period of 8 or 10 years. At the end of the second period the results are to be promulgated with such conclusions as are warranted by the facts. Foreign countries have expressed great interest in the experiment, and the final results and conclusions will doubtless prove of much value.

MOUNTAIN SNOWFALL WORK.

For many years hydraulic engineers engaged in the mountainous regions of the West were confronted with discrepancies between precipitation and run-off that were unexplainable at the time. In many localities the total annual run-off would be greater than the total measured precipitation. It was evident, of course, that the measurement of the precipitation was deficient in some way, and it was finally agreed that the trouble was due to the want of snowfall measurements in the high mountains.

Consequently, about three years ago a mountain-snowfall campaign was inaugurated by the Weather Bureau. Special apparatus was devised, and about 275 mountain-snowfall stations were opened. Snowfall measurements were made daily or weekly, according to the locality, and the depth and water equivalent of the snow carefully computed. Later it was found that some portions of the equipment were not entirely suited to the conditions, and improved apparatus has been devised in the form of a shielded rain and snow gauge. As a result of the observations thus secured the difficulties of the hydraulic engineer have already been lessened. The data are now comparable, and computations of future water supply from the winter snows in the mountains can be made with a considerable degree of accuracy.

Provision has also been made for measuring the water equivalent of snow that must be depended upon to supply water for irrigation purposes in a portion of the subarid West. A special snow survey in Utah has demonstrated the possibility of making a reasonably accurate forecast of the amount of water that will be available each season for the uses of the irrigation farmer. If the supply promises to be greater than usual, water-supply companies can arrange to dispose of more water and farmers can cultivate more land. On the other hand, if the supply promises to be less than usual, the water distribution can be lessened and the area under cultivation be restricted. The great utility of such advance knowledge is readily apparent.

BAROMETRY, THERMOMETRY, AND CLOUD OBSERVATIONS.

In Volume II of the Annual Report of the Chief of the Weather Bureau, 1900–1901, is published the "Barometry of the United States and Canada." All the barometer data were reduced to a homogeneous system of station normals computed for the epoch January 1, 1900, requiring in the case of many stations a computation of the record for 27 years. From these computations barometer tables for the reduction of the pressure readings to sea level were computed.

Such a system of normals develops many interesting and important cosmical problems, especially those regarding the seasonal variation of the climate and the forecasting of the weather conditions for longer intervals than at present practicable.

In 1907 the daily temperature normals, computed for a period of 33 years, 1873 to 1905, inclusive, were published.

In 1894, in accordance with the recommendation at the International Conference at Munich of 1891, resolutions were passed by the committee on cloud observations, inviting all countries to cooperate in cloud observation work beginning May 1, 1896. The Weather Bureau conducted these observations at 15 stations throughout the United States, and from these observations deductions were made as to the height of all classes of clouds. The "Report on the International Cloud Observations," May 1, 1896, to July 1, 1897, was published as Volume II of the Report of the Chief of the Weather Bureau, 1898–99.

MOUNT WEATHER (VA.) RESEARCH OBSERVATORY.

The plan to found an observatory at Mount Weather, Va., for research work took definite form in 1903, in which year a site was obtained on the summit of the Blue Ridge, 6 miles south of Bluemont, Va. The main building was erected in 1904, but in October, 1907, it was destroyed by fire. In 1909 a fireproof structure was erected on the foundation of the old building, a central heating and power plant was also constructed, and several buildings which had been begun at an earlier date were completed.

While the buildings were being constructed scientific work was carried on under difficulties. Surface meteorological observations were begun in November, 1904, and the results have been telegraphed to Washington daily since that time. The years 1905, 1906, and part of 1907 were spent in installing and testing instrumental equipment and in experimental work preparatory to the exploration of the free air, which at that time seemed to be a promising subject of investigation.

EXPLORATION OF THE UPPER AIR WITH KITES.

While some experimental kite flights were made as early as the autumn of 1905 the regular program of daily flights on week days did not begin until the summer of 1907, and it was not until July, 1909, that flights on Sundays were included in the regular program. The effort to get a daily sounding in all sorts of weather conditions has been a sustained and fairly successful one. In the four years, 1909–1912, there were but 39 days on which it was not possible to make a kite flight or captive-balloon ascension. When weather conditions were not favorable many of the flights naturally extended but a short distance into the air, thus making it impossible to follow the changes from one day to the next when the flights were of unequal altitude. In the five years' campaign, however, the observatory has succeeded in locating the dangerous sectors of a storm and in roughly determining from surface conditions when it is unsafe to navigate the air. The service thus rendered to the science of aviation will be more fully appreciated as time passes.

It may properly be said that the kite force at the Mount Weather Observatory brought the art of kite flying for meteorological purposes to the highest state of proficiency ever attained in this or any other country. On May 5, 1910, 10 kites, with 11.5 miles of wire, carried a recording instrument to an altitude of 4.5 miles above sea level, the greatest altitude ever reached by a kite. From July 1, 1907, to June 30, 1912, 1,772 kite flights or captive-balloon ascensions were made, mostly in the level below 3 miles.

USE OF BALLOONS.

Meanwhile the observatory had extended its work to the exploration of the region beyond the level attainable by kites. This higher stratum was reached by means of small rubber balloons filled with hydrogen gas. The ascensions were made at points in the West, where of the 91 balloons sent up 79 were recovered with good records. These records afford the only direct measures hitherto obtained of the temperature and moisture of the air at very great altitudes, and also furnish information respecting the direction and speed of the wind for the same region. On September 1, 1910, a balloon launched at Huron (S. Dak.) reached the extraordinary height of 19 miles above sea level, the highest point to which a meteorological instrument has ever been carried and afterwards returned safely to the earth.

These observations at great altitudes suggest that possibly the changes in the weather experienced at the surface of the earth originate in the levels between 9 and 15 miles above and that they are propagated downward. The basis of weather forecasting rests upon the fact that, for the most part, changes in the weather advance from west to east. If, instead of advancing horizontally over stretches of hundreds of miles, the seat of weather activity should rest less than 15 miles above us, the failure to improve forecasts based on a horizontal translation of weather conditions can readily be understood.

Experimental work is still being carried on at Mount Weather on practical problems as they arise. Aerial soundings are being made on special days, with a view of determining the height in the free air to which a diurnal wave in the temperature, moisture, and wind conditions can be traced. It is expected that this problem will be solved within the ensuing year.

AIR DRAINAGE.

In addition to the exploration of the free air by means of kites and balloons, observations on the fluctuations in air temperatures in a cross section of the atmosphere extending from the Shenandoah Valley on the west across the Blue Ridge to the Loudoun Valley on the east have been made. This is a study of air drainage, and is chiefly of interest to horticulturists.

SOLAR RADIATION.

The observatory has also conducted a series of measurements of the amount and intensity of solar radiation, the degree of absorption of the earth's atmosphere, and the polarization of blue sky light, and an automatically recording device has been installed whereby a continuous record is made of the intensity of the radiation received from the sun and sky upon a horizontal surface. Arrangements have also been perfected to secure measurements of solar radiation at other stations in the western portions of the country.

SCHOOL OF INSTRUCTION.

A part of the physical laboratory building has been set apart for use of a Weather Bureau school of instruction, wherein it is aimed to teach new employees of the weather service the duties required of them and to give them actual experience in all phases of the work that is required of assistant observers in any part of the service. This new feature of the work at Mount Weather satisfies a want that has been keenly felt during the last 20 years.

The results of the observations and investigations made at Mount Weather are regularly published in the bulletin of the Mount Weather Observatory, a publication devoted to the discussion of the scientific investigations of atmospheric phenomena.

LIBRARY.

At the central office of the Weather Bureau in Washington is maintained a library of meteorological and climatological literature, in which has been brought together from every part of the world practically all the published material available on these and kindred scientific subjects. In 1896 there were 20,940 books and pamphlets in the library; this number has since been increased to a total of 34,310 volumes.

AGRICULTURAL STATISTICS.

CROP-REPORTING SYSTEM.

One of the first undertakings of this department soon after its creation in 1862 was the adoption of a crop-reporting system for the purpose of ascertaining and publishing monthly information concerning the acreage, the condition of the growing crops, and, soon after harvest, of ascertaining the production and value of the principal crops of the year. It was in charge of the Division of Statistics, now a bureau.

For many years this system remained unchanged, until about 1896 a corps of township correspondents was established as a part of the crop-reporting system to duplicate in form the monthly reports made by county correspondents and State statistical agents.

Late in the nineties an important improvement of the system then existing was inagurated by the employment of a corps of field agents, each one of whom was to cover several States, throughout which he was to travel constantly, so as to be in personal touch with crop conditions and other subjects for which he was to make monthly reports. The improvement of the crop-reporting service due to this innovation was very great and has been increased from year to year by the employment of more field agents, by reducing the area covered by them, and by their increasing skill and accuracy in observation and estimate.

Previous to the summer of 1905 the monthly crop report was made by the chief of the Bureau of Statistics, perhaps after some discussion with members of the office force and during a very few years with one or more of the field agents.

For several years before 1905 the system had improved, but in the year mentioned it broke down in a manner that had hardly been supposed to be possible. The use of the information of the monthly crop report during the growing season, in advance of its publication, had always presented temptation to those in possession of the information to use it in taking advantage of the speculative market in produce exchanges, but the men who could have made such information available had always been trusted and no breach of trust had ever been established against anyone. Besides this, the circumstances under which the crop reports were made were such as to be regarded as making the premature surreptitious private use of the report practically impossible without prompt discovery.

In the spring of 1905 it was discovered that one of the employees engaged in the crop-reporting service in the bureau office had been secretly anticipating the crop report by speculating in produce exchanges in association with other men to whom he had prematurely divulged the report. This caused radical changes in the method of preparing this report and in the circumstances under which the work was done. A crop-reporting board was established, composed of the chief of the bureau as chairman and four other members, whose services were brought into requisition each crop-reporting day from the statisticians and officials of the bureau and the special field and State statistical services. The personnel of the board was changed monthly; the meetings were held in the office of the chief of the bureau, which was kept locked during sessions, no one being allowed to enter or to leave the room or the bureau, and all telephones being disconnected.

The procedure at the meetings of the board is now substantially as it was in the beginning. When the board has assembled, reports and telegrams regarding speculative crops from State and field agents, which had been placed unopened in a safe in the office of the Secretary of Agriculture, are delivered by the Secretary, opened and tabulated, and the reports by States from the several classes of agents and correspondents relating to all crops dealt with are brought together in convenient parallel columns on final tabulation slips.

The board is thus provided with several separate estimates, covering each State and each separate crop, made independently by the respective classes of correspondents and agents of the bureau, each reporting for the territory or geographic unit with which he is thoroughly familiar. Abstracts of the weather conditions in relation to the different crops by States are also prepared from the weekly bulletins of the Weather Bureau.

With all these data before the board, each individual member computes independently on a separate slip or final computation slip his own estimate of the crop condition or yield of each crop or of the number, condition, etc., of farm animals for each State separately. These results are then compared and discussed by the board under the supervision of the chairman, and the final figures for each State are decided upon.

It has been interesting to note how often the reports of the different classes of correspondents and agents are very nearly identical and how closely the figures arrived at independently by the individual members of the board agree. The estimate by States, as finally determined by the board, is weighted by the acreage figures for the respective States, so that the result for the United States is a true weighted average for each subject.

The present method of making the crop report by a board under the circumstances that surround and confine this board is undoubtedly proof against any premature use of the crop report and has deservedly won the confidence of the public.

In order that information contained in the crop reports may be made available simultaneously throughout the entire United States, they are handed at an announced hour on report days to all applicants and to the Western Union Telegraph Co. and the Postal Telegraph-Cable Co., which have branch offices in the Department of Agriculture, for transmission to the exchanges and to the press. A multigraph statement, also, containing estimates of condition or of computed or actual production, together with the estimates of former years, is prepared and sent immediately to exchanges, newspapers, and individuals.

Shortly after the issuance of the report it is published in the Crop Reporter, an eight-page publication of the Bureau of Statistics under the authority of the Secretary of Agriculture.

LISTS OF CORRESPONDENTS.

Besides adding the highly important field service to the crop-reporting system, the Bureau of Statistics has built up 15 separate special lists of correspondents, none of which existed 16 years ago, who are called upon from time to time for information regarding various crops, farm animals, and many subjects relating to agriculture.

One of the prominent lists is composed of about 50,000 farmers who are depended upon for various special reports. There is another list of special correspondents on whom dependence is placed for price reports, another for veterinary reports, another for reports relating to live stock on the farm; still another list of correspondents has the specialty of reporting on live stock at market centers. There is a large list of correspondents in mills and elevators. A special list of correspondents is used to collect certain information for each of the crops of tobacco, potatoes, cranberries, broom corn, hops, peanuts, beans, and apples.

If the number of correspondents in these special lists is added to the number of the regular crop correspondents, the total is about 135,000.

VARIOUS SPECIAL REPORTS.

In addition to the regular monthly crop reports, information has been collected and published each month during recent years regarding prices paid to farmers for their leading products, and many special inquiries have been made and their results published, a few of which may be mentioned: Stocks of potatoes in the hands of growers and dealers at specified dates; monthly marketings by farmers of certain leading products; wages of farm labor; values of land and average size of fields upon which corn and wheat are grown; the cost of producing corn, wheat, and oats; causes of damage to leading crops and the relative extent of each cause. The list could be much extended. Results of some of the special investigations are published in bulletins or circulars as well as in the Crop Reporter.

THE CROP REPORTER.

The Crop Reporter was first published in May, 1899. It has been published monthly since that date and has doubled in size—from 4 to 8 pages. Besides being the medium of the publication of the bureau's regular monthly reports, it contains the results of such special inquiries and studies as can be contained therein. It is supplied gratuitously to all who request it. Its principal circulation is among the farmers, and 175,000 copies of each number are now issued.

Prior to 16 years ago, bulletins and circulars on different agricultural statistical subjects had been issued by the then Division of Statistics; but during the 16 years the former division and present bureau have prepared 91 bulletins and 28 circulars.

The increase in the quantity of work accomplished by the Bureau of Statistics during the past 16 years is difficult to arrive at, but it has been very great. The growth of the domestic crop-reporting service, the large number of special inquiries and studies made, the enormous increase in the statistical correspondence of the office, and the preparation of bulletins and circulars may be conservatively regarded as having resulted in a net increase of not less than 400 per cent in the work of the bureau as compared with the volume of work at the beginning of the 16-year period, with an increase of only 21.8 per cent in the office force.

AGRICULTURAL ECONOMICS.

The Division of Production and Distribution has developed a scope of work in directions heretofore little, if at all, explored. It has created a general survey of agricultural conditions and accomplishments in the United States composed of the more important elements of production in quantity and value; of national surplus, deficiency, and consumption; of farm wealth and labor; and of economic achievement and agricultural progress.

The production of important agricultural commodities by the principal countries of the world below and above their respective requirements for consumption, the sources of the supply of such commodities to deficient countries, and the destination of the surpluses of exporting countries, together constitute a subject of unceasing popular interest which is receiving much attention in this division.

The historical aspect of the agricultural production of the United States in particular products and of the surplus or deficiency with regard to domestic consumption has occasioned much painstaking and original work.

The transportation of agricultural products from farm to consumer by wagon, rail, and water, and the costs and methods of marketing are subjects which have been productive of much original work. The division is accumulating much information relating to farmers' associations on the cooperative plan for production, selling, and buying; for fire, live stock, and other insurance; for warehousing; for performing telephone service; and for promoting mutual helpfulness.

Along the lines of work pursued the effort is to establish permanent results of frequent utility to the offices of the department, to the many applicants for information outside of the department, and to the general public. Most of the many bulletins issued from this division are of permanent usefulness and are in current demand; the many special articles that have been prepared for the Yearbook by persons employed in this division are of continuing service; and the threescore statistical tables contributed to the agricultural statistics of the Yearbook are brought down to date annually and are of permanent value.

This is an office of special research and investigation within a field not covered by any office in any other department.

DIVISION OF RESEARCH AND REFERENCE.

The Division of Research and Reference was established a few years ago. Its functions are to prepare the monthly report concerning foreign crops, the preparation of articles for the Crop Reporter, the management and care of the statistical library of the bureau, the compilation of statistics on the yield, annual area, and production by countries of corn, wheat, rye, oats, barley, and flaxseed, and the production of coffee for publication in the Yearbook, and the collation of information from publications of great variety on matters relating to agriculture for the purpose of preparing reports and answering special inquiries.

CHEMISTRY.

MANIFOLD APPLICATIONS OF THIS SCIENCE.

The period from July 1, 1897, to the present time has been one of continuous growth in the activities of the Bureau of Chemistry. During the last 16 years the work has grown in volume and range with steady and rapid progress. It now includes nearly every phase of the application of chemistry to agriculture, to the food and drug industries, and to other manufacturing industries which utilize the products of the farm as raw material.

OFFICE QUARTERS.

The contrast between the equipment at the beginning and at the ending of the period is no less marked. On July 1, 1897, the total appropriation for the Division of Chemistry was $29,500, now it is approximately $1,000,000. Then the total number of employees was 20, now over 500. Then the division occupied a small building, originally a residence, not well suited for laboratory purposes, consisting of nine rooms; now the bureau occupies a commodious, fireproof building, with 6 stories and basement, of approximately 100 rooms, constructed especially for laboratory work. In addition there are 25 branch laboratories in cities throughout the country in Government buildings or in suitable rented quarters. All the laboratories both in and out of Washington are equipped with a complete line of scientific apparatus well adapted for the work to be done. In 1901 the Division of Chemistry was organized into a Bureau of Chemistry.

METHODS OF ANALYSIS.

In the application of chemistry to agriculture the first and most important step is to develop methods of analysis. This foundation work has been done in cooperation with the Association of Official Agricultural Chemists, which is composed of the official chemists of the United States.

EFFECT OF ENVIRONMENT.

Studies on the effect of environment on the composition of grains and sugar-producing plants have been made by the Bureau of Chemistry and the Bureau of Plant Industry in cooperation with several experiment stations.

SIRUP INVESTIGATIONS.

In 1903 a study was begun of the methods of making a better table sirup from the ordinary sugar-producing plants, such as the maple tree, sorghum, and sugar cane. The work was directed toward ascertaining methods whereby the product could be made purer, better, of a more pleasing appearance, with less tendency to crystallization, and have a greater resistance to fermentative processes.

The manufacturing problems were taken up at Waycross, Ga., where a model sirup factory was erected, a special appropriation by Congress having been made for that purpose. Four important problems were solved:

(1) By arranging two mills tandem, each mill consisting of three rolls, the amount of juice extracted from the cane was practically doubled over the quantity usually extracted by the old-fashioned two-roll mill generally used throughout the cane-producing sections of the country. This is of the utmost importance to economical agriculture, since it is evidently most wasteful for the farmer to produce by scientific methods and hard labor a larger crop, half of which is wasted in the process of manufacture.

(2) In addition to the great saving by extracting practically all the juice from the cane, other economies in the process of manufacture were worked out. One of the principal problems solved was that of

utilizing the bagasse—that is, the residue of the cane as it leaves the mill—for fuel. The results of the work show that the bagasse can furnish a large part and in some instances all of the fuel necessary not only to drive the mill and press the cane, but also to evaporate the juices to the condition of sirup.

TRADE WASTES.

Important studies have been made on the effect of smelter fumes on farm crops, forests, and farm animals, and the data gathered have been used by the Department of Justice in protecting agricultural interests from such injuries. In a suit brought by the State of Georgia to enjoin certain Tennessee smelters from destroying their forests, the use of this information resulted in the smelters being forced to condense the fumes. An experiment made to determine the possibility of making sulphuric acid from this waste was very successful, and the Tennessee copper companies are at the present time producing from 100 to 300 tons of sulphuric acid a day. This total output is used for making reverted phosphate and has greatly reduced the price of this fertilizer. Thus a dangerous and devastating waste product is now utilized to the mutual benefit of the smelters, the forests, and the farmers.

The scientific demonstrations of the extent of the injury caused by such trade wastes, not only to forests, but also to irrigation streams, farm crops, and animal life, has led the Department of Justice to compel the western smelters near Government land to install devices for the condensation of the fumes, to the mutual benefit of all concerned.

INSECTICIDE INVESTIGATIONS.

The chemical examination of insecticides and fungicides has been a potent factor in improving the purity of products now sold on the market. Some idea of the value of such work to the farmer is gained by consideration of the loss occasioned by the ravages of plant diseases and insects. Experts have estimated that there is a loss of 20 per cent from these two sources, which, when applied to the farm crops of 1911 valued at $5,367,000,000, would indicate a loss of about $1,000,000,000. Probably one-third of this enormous sum could be saved by the proper application of insecticides and fungicides of the requisite strength and purity. Any inferiority in the quality of these materials means the additional loss of the labor in applying them.

The early studies of this subject showed that many of the insecticides on the market were of practically no value whatever, owing to the fact that they contained little or no active ingredients. Other insecticides which contained some active ingredients were adulterated by the addition of inert substances for the purpose of increasing the bulk to such an extent that they were of no value whatever.

As a result of the data secured by these investigations an insecticide and fungicide law was passed and approved April 26, 1910, which has greatly improved the conditions. Now it is a violation of law to ship in interstate commerce for sale any insecticide or fungicide which is adulterated or misbranded in any particular. A farmer in buying a supply to protect his crops can be reasonably sure he is getting exactly what he asks for and what he pays for. The insecticide laboratory of this bureau does a large part of the analytical work on the samples collected for the enforcement of the law. This laboratory, which conducted the investigations previous to the enactment of the law, did valuable pioneer work in developing methods for the analysis of these products. No methods of analysis had ever been worked out for many of the insecticides.

COMMERCIAL FEEDING STUFFS.

An exhaustive study of the various feeding stuffs on the market was completed in 1908, and the results published in Bulletin 108. This study furnished valuable data for the information of purchasers of feeding stuffs and for further studies of the nutritive value of the various materials used for stock foods. It also furnished information that has been of great value in the enforcement of the provisions of the Food and Drugs Act of June 30, 1906, which apply to these products. A study of the feeding value of various cereals was made and the results published in Bulletin 120. The chemical data secured from this investigation has been of value in agricultural studies of the best methods for increasing the nutritive value of various grains.

FARM PRODUCTS AND WASTES IN MANUFACTURING INDUSTRIES.

From an economical standpoint the investigations of the Bureau of Chemistry relating to the utilization of farm products for paper making, tanning, denatured alcohol manufacture, turpentine and rosin industries, and the destructive distillation of wood products are of the utmost practical importance not only to the farmer, but also to the manufacturer and to the consuming public.

PAPER AND LEATHER MAKING MATERIALS.

In no industrial enterprise is there greater opportunity for conservation than in those agricultural-chemical industries, tanning and paper making. Not only are large quantities of raw materials totally unused, but those which are consumed are not so fashioned that articles of the highest utility are produced. National reserves are being sacrificed in the wasteful production of inferior products. American paper is beautiful in appearance, and American shoes are tastefully made, but too frequently both lack durability and utility.

These investigations have pointed out the ways in which better leather and paper may be made at less expense. It has been shown that certain operations of tanning—notably bleaching, adding foreign material, and scraping off the surface of the leather—are not only useless, so far as the quality of the leather is concerned, but are positively harmful to it, and make it cost more. It is important that these facts should be more generally known, in order that the squandering of the national reserves may be curtailed and the people protected from inferior products.

Investigations in progress have shown that it is practicable to reduce the weight or bulk of paper used in this country from 10 to 25 per cent. It has been demonstrated that lighter and thinner papers can be made that are in every way superior to those now generally used. The annual cost of paper can be reduced from $2.000,000 to $3,000,000, and the equivalent in raw materials and labor conserved.

The leather and paper laboratory is in a position to propose specifications for paper for various purposes, and to show how the cost of paper may be reduced and the quality improved. In several instances the saving on mailing charges alone has paid the extra cost of higher grade papers suggested by the leather and paper laboratory.

PRODUCTS OBTAINED BY THE DESTRUCTIVE DISTILLATION OF WOOD.

Extensive investigations have been made by the Bureau of Chemistry looking toward the recovery by distillation of turpentine from dead trees, sawdust, stumps, and other refuse of the lumber industry. Owing to the constantly widening field for the use of turpentine and the gradual reduction of the supply of gum spirits of turpentine the price has steadily increased. As a result the adulteration of turpentine has been all too common. The results of the investigations have been published in Circular 36 and in Bulletins 135 and 144.

It has been demonstrated that by utilizing the stumps, dead trees, sawdust, and other waste material of the lumber industry not only all the turpentine used in this country can be profitably produced, but that all the tar pitch, rosin spirits, rosin oils, methyl alcohol, acetate of lime, and acetone can be extracted from the same waste products. In addition there could be material left for making large quantities of ethyl alcohol, paper, oxalic acid, and other chemicals. The commercial importance of these facts together with processes of manufacture are fully set forth in Bulletin 144.

DENATURED ALCOHOL.

In 1906 Congress passed a law providing that domestic alcohol may be withdrawn from bond without the payment of an internal-revenue tax, for use in the arts and industries and for fuel, light, and power, on condition that it shall have been denatured by the admixture of some material which unfits it for use medicinally or as a beverage. In 1908 the Bureau of Chemistry began an investigation for the purpose of demonstrating the manufacture of denatured alcohol on a scale suitable for utilization by the farmer or associations of farmers. A model distillery was erected and operated. Various waste farm products were used in an experimental way to determine the manufacturing process to be used in each and to find out what wastes could be profitably used. A number of State experiment stations sent men to be instructed in the operation of the plant and in the processes of distillation, in order that they would be in a position to assist the farmers in their respective States to equip and operate distilling plants. Valuable data as to the yield of alcohol from various farm products were secured. The results of this extensive investigation have been published and will be useful in the development of the industry.

TESTING CONTRACT SUPPLIES.

On July 1, 1903, a contracts laboratory was organized in the Bureau of Chemistry for the purpose of applying chemical and physical tests to supplies furnished by contractors to this and other Government departments.

Large quantities of inferior goods have been rejected and the contractor required to furnish others of standard quality. Large quantities of supplies are tested for the Isthmian Canal Commission, the Post Office Department, the Government Printing Office, and in smaller quantities for other departments. In one instance tests made by this bureau showing that supplies below standard had been furnished by a contractor resulted in the return to the Government of $100,000 which had already been paid on one order alone.

WORK FOR OTHER DEPARTMENTS.

In addition to the testing of contract supplies, the Bureau of Chemistry tests a large number of other samples, conducts chemical investigations, and makes sanitary studies for other departments of the Government. Congress has specifically authorized this bureau to make chemical investigations for other departments when requested to do so by the heads thereof. Life preservers have been inspected at the request of the Department of Commerce and Labor to determine their buoyancy, rate of water absorption, and the material from which they are made. Examinations have been made of samples of air, water, and fish food for the Bureau of Fisheries. Investigations have been made for the Treasury Department in reference to the classification of various goods for dutiable purposes. At the request of the Attorney General, investigations have been made of the effect of smelter fumes on vegetation. These are merely a few illustrations of a large number of investigations that have been made at the request of other departments.

DRUG INVESTIGATION.

On March 1, 1903, a drug laboratory was established in the Bureau of Chemistry for the purpose of studying chemicals and drugs. Valuable results have been secured. Extensive investigations of chemical reagents have been made with the view of securing more reliable chemicals for analytical work. Data have been collected for use in establishing standards.

The work done by the drug laboratory for the Post Office Department has been of special interest. Examinations have been made of a large number of remedies and fake cures of various kinds at the request of that department to assist in the enforcement of the law to prevent the use of the mails for fraudulent purposes. As a result of this work many worthless fakes have been denied the use of the mails.

EDUCATIONAL WORK.

The bureau has emphasized the value of educational work in conjunction with scientific investigations, endeavoring to make the data secured available for agricultural chemists and for other agricultural workers.

In connection with the denatured alcohol experimental work, described in another part of this report, a class in the art of distilling was conducted. Men from various State experiment stations were instructed in the processes of fermentation and distilling by actual experimental work in a model distillery plant, and by lectures by experts on the various phases of the work.

FOOD AND DRUGS ACT.

On June 30, 1906, the food and drugs act, commonly called the pure-food law, was passed. Since that time a large part of the activities of the Bureau of Chemistry has been directed toward the inspection and scientific work connected with the enforcement of that law.

FOOD STANDARDS.

In the appropriation bill for 1903 Congress authorized the Secretary of Agriculture "in collaboration with the Association of Official Agricultural Chemists, and such other experts as he may deem necessary, to establish standards of purity for food products and to determine what are regarded as adulterations therein." In accordance with this authority, I appointed as special agents members of the food standards committee of the Association of Official Agricultural Chemists, and the work of establishing standards was taken up. Later this authority was repealed.

ENFORCEMENT OF THE FOOD AND DRUGS ACT.

The food and drugs act became effective on January 1, 1907, and the actual work in connection with the enforcement of the law began on that date. The first step was to organize a force to handle the various phases of the work. The organization includes: (1) Inspectors who procure samples for analysis and information regarding the manufacture and sale of food and drugs; (2) chemists who analyze samples and make scientific investigations of problems relating to the composition and adulteration of food and drugs; (3) the Board of Food and Drug Inspection, whose duties are to consider all questions arising in the enforcement of the food and drugs act upon which the decision of the Secretary of Agriculture is necessary, to consider correspondence involving interpretations of the law and questions arising under the law, and to conduct hearings based upon alleged violations of the food and drugs act.

The enforcement of the law proceeds along two lines: First, products imported into the United States from foreign countries; and, second, products manufactured or sold in the District of Columbia or the Territories, introduced into interstate commerce, or exported from the United States.

In the case of imported foods and drugs no prosecutions are made. The effort of the department is confined to preventing the importation of adulterated or misbranded goods and causing their reshipment beyond the jurisdiction of the United States. This work is done through branch laboratories which are located at the leading ports of entry, where inspection is made of all food and drug products that enter the United States.

In the case of goods shipped into interstate commerce, or manufactured or sold within the District of Columbia or the Territories, the procedure of inspection is necessarily different. The inspectors visit all sections of the country to secure samples for analysis and such information as may be required by the department. The duties of the inspectors are as follows: (1) To investigate the wholesale and retail market and obtain samples of foods and drugs shipped in interstate commerce. (2) To inspect manufacturing establishments and secure information in regard to the nature of the foods shipped in interstate commerce. (3) To investigate the manufacture and use of substances which are or may be employed for the adulteration of foods and drugs and methods of preparation which may lead to the damage or deterioration of foods and drugs, or to the use of improper materials in their manufacture. (4) To inspect foods and drugs imported at ports where branch laboratories have not been established. In addition to these duties, special investigations are frequently made by inspectors concerning important questions of sanitation and processes of manufacture.

Samples are shipped to the laboratories at Washington or to one of the 22 branch laboratories which are located at the principal ports of entry and the leading commercial centers.

When goods are found that are in violation of the law, the dealer or shipper is given an opportunity to appear before the Secretary of Agriculture, the Board of Food and Drug Inspection, or such official as may be designated, and present evidence in reference to the question at issue. If after the hearing it appears that the law has been violated, the board makes the appropriate recommendation to the Secretary of Agriculture, who certifies the fact to the proper United States attorney through the Attorney General, together with the necessary information regarding the case. It is then the duty of the district attorney to prosecute the case in the United States district courts.

The law also provides that adulterated or misbranded food or drugs sold or offered for sale in the District of Columbia or the Territories, imported, delivered for export, or introduced into interstate commerce may be seized and disposed of by destruction or sale, as the court may direct.

INVESTIGATIONS UNDER THE FOOD AND DRUGS ACT.

In addition to the chemical analysis of samples taken in the enforcement of the food and drugs act, a great deal of work has been necessary in the way of investigating manufacturing processes and trade practices in many classes of food and drug products. A considerable portion of the time of the analysts of the bureau has been devoted to research work along these lines. In the scope of this report it is only possible to refer in a general way to a few of the important studies. The investigations have two general objects in view: (1) To secure data on which to base action under the food and drugs act. (2) To show manufacturers and dealers how they can prepare, pack, and ship their products in such manner as to increase their quality and purity and bring them up to a standard that will be in harmony with the law.

Among the important scientific investigations which have resulted in direct action under the food and drugs act may be mentioned that of the shellfish industry. In collaboration with the Oyster Packers' and Growers' Association, a number of experimental shipments were made on a commercial scale, oysters being taken from several localities of the United States and shipped by the different methods in ordinary practice. Chemical and bacteriological examinations were made of the oysters before and after shipping. Action was taken to stop practices in washing, packing, and shipping which were shown to be detrimental to the product. Extended investigations have also been made of the pollution of oyster beds from sewage, and action has been taken to prevent the shipment of oysters from such beds.

The effect of cold storage on various food products has been the subject of extended study, and much valuable data have been secured.

As a result of other investigations, seizures and prosecutions have been made of a long line of food and drug products, among which may be mentioned eggs well advanced in decomposition which are broken and sold in bulk in a frozen condition, figs, olives, and various kinds of dried fruit, and flour badly infested with insects. Coffee glazed with chrome yellow, macaroni colored with a poisonous coloring matter for the purpose of simulating the rich color given by eggs, and flour bleached by nitrogen peroxid for the purpose of simulating the white color of the patent flour from certain wheats are other examples.

The milk supply received from neighboring States has been investigated in a number of large cities, and several successful prosecutions have been maintained for the shipment in interstate commerce of milk adulterated by watering, skimming, or prepared in such insanitary surroundings that it was not suitable for consumption.

Important work has been done toward prohibiting the shipment in interstate commerce of misbranded and adulterated stock feed, mineral waters, flavoring extracts, dairy products, sugar and molasses, medicated soft drinks, vinegar, drugs, fake cures, and poisonous colors. The few illustrations suggest the many lines along which the work is directed.

CONSTRUCTIVE SCIENTIFIC FOOD WORK.

It has been found that by far the larger number of food manufacturers and dealers desire to comply fully with the law and to handle only pure and standard products. Many of them, however, owing to lack of technical knowledge or suitable equipment or adverse local conditions, have experienced difficulty in reaching the high standard necessary to fully meet the requirements of the law. The pure-food board has undertaken, in a number of lines where the difficulties seemed greatest, to work out methods by which the product could be properly controlled and to demonstrate to the manufacturers how they can put on the market goods that are of the required standard. Trained experts have gone into the factories and studied the problems involved in the manufacture, the packing, the shipping, and the marketing of the products. The industries in which this work has been done have cooperated to the fullest extent with the bureau and have eagerly adopted improved methods that have been pointed out to them.

This constructive work naturally follows the police work under the law. It has been possible only to make a good beginning with our limited appropriation, but the results already attained indicate that this work can be extended with advantage to manufacturers, dealers, and consumers of food products.

Along this line an investigation of methods for preparing and shipping poultry and eggs in order to prevent deterioration is in progress. The industries concerned are bringing their problems for solution, and are offering the most hearty cooperation in furthering the work. The improved methods evolved have not only prevented losses, but have improved the quality of the product. The cooperators include not only associations of poultry dressers and merchants, but also railways, refrigerator transportation companies, and cold-storage warehousemen. The results so far attained have been most gratifying and still further improvements are expected.

Another important work along this line is being conducted in cooperation with the canning industry. A study has been made of the material to use in the manufacture of the can, and the degree of temperature and length of time that should be given in processing in order to get the best result in the finished product. An experimental factory has been erected and valuable data for improving the methods of canning have been secured.

Experts have been sent to factories to show how different food products could be put up and kept indefinitely without the use of any chemical preservatives. A study was made at Gloucester, Mass., of the cause of reddening of dried cod and other salt fish. Methods were worked out for improving the sanitary condition of the water supply and of the fish factories, which resulted in less infection and resultant spoilage.

RESULTS OF THE FOOD AND DRUGS ACT.

There has been a marked improvement in the food and drug supply of the Nation as a result of the enactment and enforcement of the pure food and drugs law that has been of great benefit to the industries involved, as well as to the consuming public. No longer do the honest manufacturer and dealer have to compete on uneven terms with the misbranded and cheapened product of the dishonest competitor. The law prevents misbranding on the one hand and adulteration on the other. The product of low grade must be sold for what it is, and can not pass under the colors of a higher grade to the deception of the buyer and unfairness to the competitor.

As an illustration of the benefits derived from proper branding may be mentioned the use of medicines that contain cocaine, morphin, alcohol, and other habit-forming drugs.

The adulteration feature of the law protects the consumer from added injurious substances, from any manipulation that lowers the strength or quality, and from carelessness in manufacturing, packing, or shipping that results in the contamination of the product. The better element in all the industries affected have cooperated with the department in bringing about a strict enforcement of the law, and the bureau is now making preparations to still further aid the industry in solving the technical problems involved in the improvement of the products.

OFFICE OF PUBLIC ROADS.

PROGRESS IN USEFULNESS.

During the past 16 years the Office of Public Roads has grown from a small organization with an annual appropriation of $8,000 and employing 7 persons to a thoroughly developed organization with 165 permanent and temporary employees and an annual appropriation of $202,120. There is also an appropriation for the current year of $500,000, made by Congress to be expended under the direction of this department on post roads. It is provided that in order to avail themselves of this appropriation the States or localities interested shall contribute $2 for every $1 contributed by the National Government. The Department of Agriculture, through its Office of Public Roads, will thus direct the expenditure of $1,702,120 this year.

During the fiscal year 1896–97 the office directed the construction of 7 object-lesson experimental roads, while during 1911–12 there were built 31 object-lesson roads involving 400,775 square yards of surfacing. From 1897 to 1912, inclusive, 343 object-lesson and experimental roads have been constructed. It has been found that object-lesson roads built under the direction of engineers from the office are a most effective method of carrying information concerning standard construction to the various localities. The cost of construction is borne by the localities in which roads are built. The number of roads built each year by the office from 1897 to 1912, inclusive, is as follows:

1897	7
1898	10
1899	4
1900	7
1901	14
1902	15
1903	8
1904	17
1905	21
1906	17
1907	16
1908	18
1909	57
1910	49
1911	52
1912	31
Total	343

The activities of the office reflect, in a measure, the progress and present condition of the road movement in the United States. Sixteen years ago only four States had passed State-aid laws and established State highway departments to direct the work, viz, New Jersey, Massachusetts, Connecticut, and California. At the present time, however, the principle of State-aid has been adopted in 40 States.

The Office of Public Roads was originally the Office of Road Inquiry in the Department of Agriculture, and was established under authority of an act of Congress of March 3, 1893, with an appropriation of $10,000. It was provided by law that the Secretary of Agriculture should make inquiries in regard to systems of road management throughout the United States, make investigations in regard to the best methods of road making, prepare publications, and assist agricultural colleges and experiment stations to disseminate information concerning roads.

EXPERIMENTS IN CONSTRUCTION AND MAINTENANCE.

For the fiscal year 1912 Congress appropriated $10,000 to conduct field experiments in various methods of road construction and maintenance and to investigate various road materials and preparations. This appropriation has enabled the office to conduct a series of independent experiments along comprehensive lines.

TESTING ROAD MATERIALS.

In December, 1900, a laboratory was established in the Bureau of Chemistry for the testing of road materials. This laboratory was transferred in 1905 to the Office of Public Roads, where its present organization has been developed and perfected. From 1900 to June 1, 1912, 6,060 samples of road materials have been tested, including rock, gravel, sand, slag, clay, brick, cement, iron, steel, asphalt, oil, tar, rubber, and various other substances.

Much has been accomplished in the development of the physical tests of rock for road building, and the methods here adopted are now practically standard throughout the United States.

Research work in concrete has been productive of promising results. The properties of oil-mixed Portland cement concrete have been investigated, and indicate this material to be one of merit for damp-proofing purposes. A public patent has been granted for this material, so that any one may now use it without the payment of royalties. Measurements of the expansion and contraction of concrete while hardening, which are of value to concrete engineers, have aroused considerable interest and serve to explain certain phenomena in connection with concrete construction.

Experiments have been conducted to determine the efficiency of oils, tars, asphalt, and other preparations used for the purpose of preventing dust and preserving macadam roads under modern traffic conditions. Laboratory experiments have been accompanied by service tests and experiments in the field. The office has also conducted investigations to determine the feasibility of building sand-clay and burnt-clay roads in the Southern States and in the Mississippi Valley. Such construction has been found to be practicable for certain regions where materials are available and climatic conditions favorable.

Successful efforts are constantly made to bring about a more general use of the split-log drag in the maintenance of earth and gravel roads.

MODELS OF TYPES OF ROADS.

In order to better demonstrate the fundamental principles of road construction, the office has built a number of models of various standard types of roads and bridges and of road-building equipment, including road machines, rollers, and crushers. A set of models was first exhibited at the Alaska-Yukon Exposition. Since that exposition closed, similar exhibits have been shown in many parts of the United States through the medium of expositions and by means of exhibit trains operated by various railroad companies. The cost of making such demonstrations has been paid by the expositions or by the railroad companies interested. Lecturers and demonstrators from the office have accompanied exhibits and made them to a large degree schools in road building.

TRAINING HIGHWAY ENGINEERS.

Realizing the need for trained highway engineers, the office inaugurated a plan in the year 1905 whereby a number of graduates in engineering are appointed each year from engineering schools and colleges after competitive examinations. These men are given a thorough training in road building, while they also render practical service to the Government. An efficient corps of highway engineers is thus prepared to carry out road building along correct lines. A number of engineers from the office are already connected with State and county highway departments in various parts of the United States, while several of them are constantly retained in the Government service.

INVESTIGATIONS.

The office has investigated the decomposition of rock powders under the action of water and discovered important facts with reference to their use as road materials. Investigations into the corrosion of iron and steel culverts and fences have also been productive of important results, and the matter of protective coatings has been extensively studied.

STANDARD SYSTEMS.

In May, 1907, the office inaugurated a project designed to introduce improved standard systems of construction, maintenance, and administration of roads into various counties throughout the United States. Under this plan experienced engineers are assigned to make thorough investigations on all phases of the road work of various counties and to prepare exhaustive reports with plans, estimates, and recommendations. This method has already resulted in the saving of thousands of dollars to the counties where such model systems have been adopted.

OFFICE EQUIPMENT.

Thorough and systematic methods of organization have been introduced into the administration of the office. Each employee is given specific duties to perform, and a careful system of reports and records is kept of work done and expenditures made on every project. The most approved system of filing is in use, and a library has been established containing a complete collection of periodicals, manuscripts, pamphlets, reports, and books on all phases of road work. This library is being added to constantly. Fifty-nine periodicals are now regularly received, of which 44 are donated.

The office has in its files 8,237 photographic negatives and about 5,000 lantern slides illustrating nearly every item of road improvement. These slides are extensively used by representatives of the office in lecture work. During the year just closed 1,135 lectures were delivered by representatives of the office, nearly all of which were illustrated with lantern slides.

From 1897 to the present time the office has issued 28 bulletins, 73 circulars, 10 farmers' bulletins, 19 Yearbook extracts, 15 annual reports, and 1 lecture syllabus; a total of 146 publications.

ECONOMIC BENEFITS OF ROAD IMPROVEMENT.

Investigations are now under way to determine the economic benefits resulting from road improvement and the particular relation of such improvement to agriculture. It is evident that when $142,000,000 constitutes the annual expenditure for road purposes in this country, improved business management in our road work is imperative. Much statistical work is therefore carried on, particularly on the subjects of mileage, cost, and financing. The method of financing road construction by bond issues is becoming very common and is receiving considerable attention from the office, with the view to giving appropriate information to those who contemplate such methods of road financing. In order that the office may be kept in close touch with road work, a collaborator is employed in each State to act as representative and corresponds monthly with the office.

MILEAGE OF ROADS.

An investigation was begun in 1904 to ascertain the mileage of improved and unimproved roads, rates of levy, and sources of revenue in every county in the United States. This work was finished in June, 1907, and shows that there were then over 2,150,000 miles of roads in the United States, of which only 7.14 per cent were improved. The expenditure in money and labor for that year amounted to nearly $80,000,000. A similar investigation begun in 1909 shows that there were, in 1909, 2,199,645 miles of public roads in the United States, of which 190,476 miles, or 8.66 per cent, were improved. Information in regard to expenditures on all the public roads in the United States was collected during the year 1911. This investigation shows that the expenditures for that year amounted to approximately $142,000,000.

CLEARING HOUSE FOR ROAD QUESTIONS.

The Office of Public Roads is alive to the present problems of highway development, and its efforts are constantly and systematically directed toward their solution. The normal development of the office during the past 16 years has placed it in such a position that it may now be called a clearing house for all road questions.

OFFICE OF EXPERIMENT STATIONS.

EXTENSIONS OF WORK.

During the last 16 years the Office of Experiment Stations, which was established primarily to represent the department in its relations with the State agricultural colleges and experiment stations, extended its field of work to include supervision of experiment stations under the direct control of the department in Alaska, Hawaii, Porto Rico, and Guam. It also undertook work having as its object the promotion of farmers' institutes and other forms of extension work, and was assigned the management of special investigations in irrigation and drainage.

PUBLICATIONS.

The publications of the office, which furnish a fair index of its activities, increased from 39 documents, containing 2,600 pages, in 1897, to 85 documents, containing 4,761 pages, in 1912.

The Experiment Station Record, which reviews the world's literature on scientific agriculture for the use of investigators in this line, in 1897 consisted of one volume of 1,210 pages, containing 1,565 abstracts. In the year ending June 30, 1912, two volumes of the Record were issued, each containing nearly 1,000 pages, and containing in the aggregate 7,800 abstracts. The Record about doubled in size in this time, and the volume of literature reviewed in it more than doubled.

In 1897 a series of popular bulletins, known as Experiment Station Work and published in the Farmers' Bulletin series of the department, was begun, to supplement the Record and disseminate the results of the more practical work of the experiment stations. Up to date there have been issued 70 numbers of this series of bulletins, containing over 600 articles on a variety of topics of interest to the practical farmer.

GROWTH OF EXPERIMENT STATIONS.

The growth and development of the experiment stations during the past 16 years is also indicative of the growth of the office during this period. In 1897 the stations employed 628 persons in the work of administration and research, while in 1911, the last year for which statistics are available, the stations employed 1,567 persons in their administrative, research, and other lines of work. Likewise in 1897 the stations had a total income of $1,129,833, of which $720,000 represented the Hatch Act, while in 1911 their total income was $3,662,425, of which $1,440,000 was received from the United States under the Hatch and Adams Acts. In other words, the employees and income of the stations more than doubled during the period named.

THE ADAMS ACT.

The Adams Act, passed in 1906, doubled the Federal appropriations to the State experiment stations and greatly increased the duties of the office in relation to the use of these funds for research work. The legality of the expenditures is so largely dependent upon the character of the investigation that the supervision of the funds becomes in a large measure a supervision of the investigations and experiments as far as their character, original features, and continuity are concerned. Since the passage of the Adams Act this office has considered and approved over 600 projects outlined and submitted by the stations to be carried on with the fund provided by the act. Numerous questions arise as to the nature of the work and entail a large amount of correspondence to effect a settlement of the different problems. The Adams fund projects of the experiment stations represent a vast amount of original investigation, and there probably has never been an attempt to supervise research work conducted on such an extensive scale.

COOPERATION WITH STATIONS.

The experiment stations during the period under discussion have freely cooperated with this department in numerous lines of work and have been highly instrumental in carrying the benefit of the department's efforts to the different agricultural sections and to the individual farmer. Among the numerous lines of activity which have made marked progress as the result of vigorous efforts on the part of the department and the stations may be mentioned the utilization of lands hitherto unproductive on account of limited rainfall or lack of crops suited to the conditions.

One of the results of this work is the bringing under cultivation of large areas of dry lands and the making regions of deficient rainfall available for settlement. In this connection the introduction of durum wheats by this department and their distribution largely through the stations has been of great value to the Great Plains region and other sections where dry farming is practiced.

Plant-breeding work has undergone a remarkable development during the past 16 years, and in no other field has the work of the department, supplemented extensively by experiment-station effort, met with greater success. The production of improved seed corn has become the rule rather than the exception, and numerous varieties and strains of field, garden, and orchard crops have been originated and distributed. The Wisconsin station has distributed improved tobacco seed, pedigreed barleys, and pure-bred varieties of oats. The Minnesota station has bred a winter rye, hardier and producing greater yields than varieties ordinarily grown, and has originated and sent out a variety each of wheat, oats, corn, and flax, now commercially known and quite widely grown in Minnesota and the adjoining States. The South Dakota station has produced and given to the public some excellent hybrid plums, plum and sand cherry crosses, and hybrid raspberries, in addition to carrying on breeding work with hardy alfalfas and other promising forage crops for the

Northwest. These few examples are given to show the general trend and results of this work. There is not an experiment station in the United States to-day that does not pursue some line of plant breeding either for the purpose of improvement in yield and quality or of adaptation to particular conditions of soil and climate.

The beet-sugar industry of this country was built up practically during the past 16 years. The department aided this industry by the distribution, largely through the experiment stations, of tons of sugar-beet seed with a view to determining where the best beets could be produced and in what sections beet-sugar factories could be operated with profit and success.

Numerous other instances of cooperation between the department and the experiment stations, either prearranged or otherwise, could be given. The stations have followed up closely the department's work on plant introduction, hog-cholera serum vaccination, suppression of bovine tuberculosis, and other phases of work of sectional and national importance.

AGRICULTURAL EDUCATION.

In 1897 there were 61 colleges giving instruction to 4,000 students in agriculture; in 1911 the 67 State agricultural colleges enrolled almost 18,000 students in agriculture, and there were also 42 privately endowed colleges giving courses in agriculture. The total income of the land-grant colleges in 1897 was $5,000,000; in 1911, $22,000,000, and the total value of their property increased from $51,000,000 to $120,000,000.

Very few of the agricultural colleges gave opportunities for graduate study in agriculture prior to 1897, and there was no national graduate school of agriculture. Since then five sessions of the Graduate School of Agriculture have been held under the auspices of the Association of American Agricultural Colleges and Experiment Stations, and 43 of the agricultural colleges now give graduate courses in agriculture. None of the agricultural colleges trained teachers for high schools in 1897; now 40 of them do this. Then none had extension departments; last year they enrolled 169,000 students in correspondence and extension courses in agriculture.

There were 9 agricultural high schools in 1897, 78 in 1912. No public high school then taught agriculture; now 289 of them in 11 States receive State aid for courses in agriculture, home economics, and farm mechanics, Minnesota alone giving $125,000 a year for these purposes. Over 1,600 other high schools give instruction without State aid.

Agriculture in the elementary schools had hardly been thought of in 1897, whereas now nearly every State in the Union gives some encouragement to such teaching, and 19 require it by law. To prepare teachers for this work 196 normal schools now give instruction in agriculture.

In 1897 the department listed 70 colleges and high schools as teaching agriculture; now the list—an incomplete one at that—includes 2,575 colleges and high schools in the United States.

Prior to 1897 the Office of Experiment Stations had no regular agricultural education service, and it had issued only about two dozen publications relating in any way to agricultural education. Since that time it has issued 123 publications, dealing with all phases of agricultural education, of which hundreds of thousands of copies have been sent to all parts of the country. It has five people giving all of their time and five others giving a part of their time to the promotion of agricultural education. For 17 years the director of the office has been a member of the committee on instruction in agriculture of the Association of American Agricultural Colleges and Experiment Stations, and for all five sessions of the Graduate School of Agriculture he has been dean of the school.

The agricultural education service of the office represents the department in its relations with agricultural colleges and schools at home and abroad, cooperates with other bureaus of the department in educational projects, and lends advice and assistance in every way possible to State and National institutions and organizations for agricultural education.

FARMERS' INSTITUTES.

The work of aiding in the development of the farmers' institutes was officially undertaken by the department in 1903 under an act of Congress of that year providing for the appointment of a farmers' institute specialist. His duties as defined by the act were "to investigate and report upon the organization and progress of farmers' institutes in the several States and Territories and upon similar organizations in foreign countries, with special suggestions of plans and methods for making such organizations more effective for the dissemination of the results of the work of the Department of Agriculture and of the experiment stations and of improved methods of agricultural practice." An institute specialist was appointed, who entered upon his duties April 1, 1903.

STATISTICS.

Prior to this appointment the Office of Experiment Stations in 1900 had collected information in regard to the status of the institute work of the country, which was published as Bulletin No. 79, and again in 1902 data were gathered and tabulated and published by the office in its annual report. According to that report institutes were held in that year in 43 States to the number of 2,772, with an attendance of 819,995, and funds were contributed by the State legislatures for institute work to the amount of $145,650, and there was received from other sources $17,474. This was the status of the work when the department established the farmers' institute office.

The progress made since then is seen in the report of the institute specialist for the year ended June 30, 1912. During that year institutes were held in all of the States and Territories excepting Alaska, Hawaii, Nevada, and Porto Rico. The total number of meetings was 7,079, covering 9,429 days and composed of 17,760 sessions. The attendance at the regular institutes was 2,483,028, and the amount appropriated for their support was $516,072, not counting sums contributed by individuals for rent of halls, entertainment of lecturers, advertising, and other local purposes.

As an outgrowth of the general or mixed institute there have developed since 1902 the women's institute, institutes for young people, the movable school of agriculture, the instruction train, the round-up institute, the field demonstration, agricultural picnics, institute exhibits at local and State fairs, the agricultural club, and the correspondence course. Attendance upon these special forms of institute activity in 1912 was 1,476,477, making the total attendance at institutes of every kind during the year 3,959,505. The body of expert lecturers in the employ of the State directors giving instruction in the institutes now numbers over 1,100. No such school of instruction equal either in number and skill of its teachers or in the number of adults attendant upon it exists anywhere else in the world.

THE DEPARTMENT'S RELATION TO INSTITUTES.

The work has been along the lines directed in the act authorizing the employment of a specialist. Statistical data and other information respecting farmers' institutes and other forms of agricultural extension both in this country and abroad have been gathered and prepared for publication. Numerous addresses before farmers' associations and in educational institutions have been delivered. Bulletins and circulars upon agricultural extension have been prepared. The proceedings of agricultural associations and conventions have been edited and published. Officials connected with agricultural extension work in the agricultural colleges, fair associations, State libraries, railroad agricultural extension departments, State departments of agriculture, and other associations interested in agricultural extension work have been visited and interviewed. Printed information has been distributed, and the correspondence of the office has been conducted.

The institute specialist has for a number of years acted as secretary of the committee on agricultural extension work of the Association of

American Agricultural Colleges and Experiment Stations, and also as secretary-treasurer of the American Association of Farmers' Institute Workers. He has collected annually for the Association of Colleges and Stations data respecting agricultural extension and has prepared the programs and selected lecturers for the annual meeting of the Association of Farmers' Institute Workers. A large amount of travel has been performed by the institute specialist and his assistant in promoting extension work, and a great number of lectures have been delivered before meetings of agricultural people in both State and National conventions. Numerous addresses and papers have been prepared by the office for publication, and a large correspondence has been conducted. Over 20,000 names of prominent agriculturists in the United States have been listed, representing all forms of extension activity.

PUBLICATIONS.

There have been prepared and published as original matter by the Farmers' Institute Office 6 bulletins consisting of 392 pages, 15 circulars of 335 pages, 9 annual reports of 420 pages, 2 separates of 29 pages, and 1 illustrated lecture of 25 pages; a total of 1,201 pages.

There have also been edited in the office 13 bulletins, 1,909 pages; 13 illustrated lectures, 278 pages; a total of 1,368 pages. There have been prepared in the office and are now ready for publication 3 bulletins of 370 pages of manuscript, and there has been edited and sent into the editorial division 1 bulletin, 76 pages.

There have been added to extension literature by the institute office contributions along the following lines: The origin and history of farmers' institutes in the several States; the laws under which the institutes operate; information respecting agricultural education for adults in 25 foreign countries; forms of extension work for agricultural colleges and experiment stations; the names and addresses of farmers' institute directors and lecturers in the United States; form of organization and courses of study for movable schools of agriculture; forms of organization for institutes for women and for young people; reports upon transportation companies of the country as factors in agricultural education; annual report upon the farmers' institute work in the several States with suggestions for its improvement; a series of lectures upon agricultural subjects illustrated by 641 lantern slides; also reports of the proceedings of the American Association of Farmers' Institute Workers, comprising 651 pages, and containing discussions of institute problems by the leading institute directors, lecturers, and educators of the United States and Canada; a translation of the results of agricultural extension work in Belgium, together with papers, discussions, and addresses before meetings of agricultural people in both State and National conventions.

The effort has been to develop forms of extension already in operation, and to introduce new methods for use by State officials and college-extension directors engaged in agricultural instruction work. During this period the foundation of a permanent system of farmers' institutes has been laid and direction given to the conduct of the work throughout the country.

INSULAR STATIONS.

Agricultural experiment stations were established under the supervision of the Office of Experiment Stations in Alaska in 1898, in Hawaii and Porto Rico in 1901, and in Guam in 1908, preliminary surveys having shown the apparent necessity of such investigational institutions in the different regions. The policy adopted at the beginning and maintained ever since was to determine and develop the agricultural possibilities of Alaska, to diversify the agriculture of Hawaii and Porto Rico, and to restore that of Guam to its former importance.

ALASKA.

In Alaska, on account of the size of the country and the diversity of conditions, stations have been established at various points along the coast and in the interior valleys. The principal lines of work have been agriculture, horticulture, and stock raising. At Sitka, where headquarters are maintained, horticulture has been given prominence, and not only have varieties of garden vegetables been found adapted to that region but bush fruits have been introduced and are flourishing, apples and cherries have been matured, and hybrid strawberries produced that excel in hardiness and quality any cultivated varieties that have been tested.

In the interior valleys, at Rampart and Fairbanks, grain farming is being especially studied. A majority of the varieties of barley and oats have ripened every year at Rampart since the station was established in 1900, and some varieties of wheat and rye have likewise matured. Last year practically all varieties of cereals ripened. Some hybrid barleys have been produced that for earliness excel any of the introduced ones. Siberian alfalfas have been successfully introduced and have withstood the winter climate for two years. At Fairbanks similar results have been secured, and these two stations represent a large area of land whose agricultural possibilities are by no means unimportant. Potato growing has been given attention at all the stations, and at Fairbanks field yields of over 200 bushels per acre were secured in 1911.

At the station on Kodiak Island attention has been given for about six years to stock raising, and Galloway cattle have been found perfectly adapted to the country, a herd of nearly a hundred head having been maintained almost exclusively on pasture, silage, and hay made from native grasses.

The investigations thus far conducted in Alaska have shown that a considerable amount of agriculture is possible in that country; within limits it is possible to recommend varieties of all the better known vegetables for cultivation in the different regions of the Territory, and the possibilities of cattle raising have been fully demonstrated.

HAWAII.

In Hawaii the diversification of agricultural industries has been the main problem of the station. Through its efforts a number of new industries have been established and others aided in their development. Investigations showed the possibility of tobacco growing in Hawaii, and several companies and individuals have engaged in it on a commercial scale. One company expects to plant 200 acres of tobacco in 1913.

The rapid development of the pineapple industry in Hawaii owes not a little to the station, and this crop has become second in importance among the agricultural industries of the islands, the estimated pack of canned pineapples of one of the largest companies being 360,000 cases for 1912.

The station has assisted materially in developing a rubber industry in Hawaii, and has shown the possibility of growing cotton on a commercial scale. In this work sea-island and Caravonica cotton are successfully grown as perennial crops, the plants being pruned each year to get the best results.

A very extensive study of the rice crop has been made, and new varieties of better yielding character have been bred and distributed. The method of fertilizing rice was found faulty, and instead of nitrate of soda being used at an actual loss the crop may be doubled by the use of sulphate of ammonia applied when the crop is sown. Next in efficiency is bean-cake meal. Practical methods for the propagation of choice varieties of tropical fruits have been worked out that are being put in practice not only in Hawaii but elsewhere.

The peculiarities of the Hawaiian soils are being studied, and the effects of some of the more unusual soil constituents are being tested. A considerable number of forage plants and other plants of economic importance have been introduced and are receiving wide attention. Insect pests are being studied, and methods for the control of some have been discovered.

PORTO RICO.

In Porto Rico the problems of diversification of agriculture have been about the same as in Hawaii, where sugar production is the leading industry. The station early took up the problems of citrus-fruit and pineapple production, and the exports of these fruits have grown from less than $100,000 in 1900 to over $2,100,000 in 1911. The station has shown in growing these crops that in Porto Rico at least windbreaks are necessary for citrus fruits and that too much lime in the soil must be avoided in planting pineapples.

The renovation of coffee plantations has been given much attention with promising results, and the value of pruning, fertilizing, and cultivating the trees has been demonstrated. By following these means a renovated plantation was made to more than double the average yield of the island. New varieties of coffee have been introduced, and many of the higher priced coffees of the world are now in bearing and their seed is being distributed for planting.

Much attention is being given to insect pests and fungus diseases, and marked progress has been made in combating them. Windbreaks as conservers of moisture in citrus groves have been found an efficient means of securing conditions favorable for the development of fungi which destroy some of the most troublesome scale insects affecting oranges. A special study has been made of some of the so-called sick soils of Porto Rico, which from chemical and physical composition should be productive but which are almost wholly barren. The causes of their peculiar behavior appear to be biological, and means for their improvement are being worked out.

An effort is being made to improve the live stock of the island, and the station has introduced improved breeds of horses, cattle, swine, and poultry, and the presence of such animals is already apparent in the better grades of stock found in many localities.

GUAM.

In Guam from various causes agriculture had fallen to a very low plane and production was much below the food requirements of the island, and the immediate problem has been its improvement. The first efforts were in the securing of better varieties of crops and the introduction of new ones that have proved valuable in other tropical countries. In this the station has been very successful, and a number of forage plants, varieties of corn, vegetables of various kinds, tropical fruits, etc., have been thoroughly established.

Following the demonstration that forage could be readily produced, improved horses, cattle, swine, and poultry have been sent to Guam, and late reports state that they are doing well in their new surroundings. Only one year has elapsed since the stock was sent to Guam, but their presence has already awakened among the people a desire for better animals upon their ranches.

The work before the stations is the same as it was in the beginning—pioneering in Alaska, the diversification of agriculture in Hawaii and Porto Rico, and improving agricultural methods in Guam. Some progress has been made, but much yet remains to be done. In nearly every locality where stations have been established the results of their work are seized upon and put into practice. The stations are heartily cooperating with the people by furnishing advice, new seeds, etc., and in turn the people are right loyally supporting the stations according to their ability to do so.

NUTRITION INVESTIGATIONS.

Sixteen years ago the nutrition investigations of the Department of Agriculture had just passed the organization period and begun the period of development which since that time has been steady and continuous. The purpose of these investigations is to study the use as food of products of farm, ranch, and garden, and to bring the results obtained to the attention of housekeepers, and thus help them in making the best, most rational, and most economical use of available resources.

A great variety of questions have been studied, and the results obtained have been of very decided value to the housekeeper, as well as to the producer of food supplies and those who manufacture, handle, and market them. As a whole the investigations have provided and made accessible a large amount of data regarding the composition and nutritive value of American food materials, their properties, and their uses. Special investigations have been numerous, as is shown by the references which follow.

DIGESTIBILITY.

The relative digestibility of bread made from different sorts of flour has been studied exhaustively, the conclusion reached being that coarse flours are somewhat less thoroughly assimilated than fine grades, but as a whole all are well digested and are very valuable foods. Similar studies have been made of the relative digestibility and nutritive value of meat of different kinds and cuts. Whatever the cut, mutton, beef, and other meats were found to be very thoroughly assimilated and valuable sources of protein and energy in the diet. Cheese has been studied exhaustively, and, judged by its thoroughness of digestion and other nutritive qualities, it is to be regarded as a staple food suitable for use in quantity rather than as an article for occasional use. Studies of the digestibility and nutritive value of cereal breakfast foods and other cereal foods, of food and food products, of nuts, and of vegetables of different sorts have also been carried on.

From these and other studies which have been made to learn the thoroughness of digestion of ordinary foods of different sorts prepared in the usual ways average figures have been deduced, with the aid of which thoroughness of digestion can be computed with reasonable accuracy—a great convenience under many circumstances.

COOKING PROCESSES.

Much time has been given to the effects of various cooking processes on nutritive value and digestibility and to the relative value of different methods of preparing food when judged by quality, palatability, and the labor involved. The results show clearly that laboratory methods can be as profitably used in the solution of such questions as they can be in milling, paper making, dyeing, and other commercial industries.

DIETARY STUDIES.

Dietary studies have been carried on in homes and in public institutions, which have furnished data of great value regarding the living conditions of the American people and have helped in the formulation of dietary standards which are used as guides in home and institution management. The studies have also furnished information of use in the selection and preparation of foods as well as in providing quantities sufficient for adequate nourishment without undue waste.

RESPIRATION CALORIMETER.

The respiration calorimeter 16 years ago was in the experimental stage. Since that time it has been perfected and so simplified that it can be operated with ease and made to furnish results of great accuracy. The uses to which it may be put in the study of food problems are very numerous and by no means exhaust the field of its usefulness. A later development of this apparatus is designed for the study of fruit ripening and other problems of vegetable life, a kind of work original with the department and full of possibilities for helping the grower, the shipper, and the handler of fruits and vegetable products, as well as the housewife who uses them. Plans involving cooperation with other bureaus of the department have been formulated which have to do with the ripening of fruits and other vegetable products and the handling and care of animal products.

Studies planned, or already in progress, have to do with the food value of mutton, the relative nutritive value and culinary qualities of different animal and vegetable fats, the use of dried fruits in the diet, the relative ease of digestion of different foods, and other similar work. In carrying out these projects the respiration calorimeter will be used.

PUBLICATIONS.

Of the 62 technical publications which have reported the results of nutrition investigations, all but 10 have appeared during the last 16 years, as have all but 3 of the 50 Farmers' Bulletins and other popular publications, which have summarized information on food topics in such a way that it might be valuable to the housewife and the student. The demand for the technical bulletins and nutrition charts has exceeded the supply, while the demand for popular bulletins has grown very greatly, particularly during the last 10 years, and has been so large that over 12,000,000 copies of Farmers' Bulletins on bread, meat, milk, fish, eggs, and other foodstuffs, and their care, preparation, and use in the home, and a correspondingly large number of other popular nutrition documents, have been required to meet it; and the demand is still growing.

This widespread distribution of information pertaining to home problems is equivalent to an increase in the available food supply, since it makes possible a better and more economical use of available resources, and shows how needless waste and loss may be avoided.

Farmers and housekeepers have come to realize that the Department of Agriculture devotes its energies to questions which are fundamental to their interests and that it can and is ready to help them solve their problems. As a result, they turn to the department for help in increasing numbers. This is strikingly the case in all that pertains to food and nutrition. Thousands of letters are received each year from housekeepers, home makers, teachers, students, and others, and, in so far as it can be done, the desired information is supplied, either in printed documents or more directly by letter. The department has been called "the people's university," and as a disseminator of knowledge of farm and home topics it well deserves this name.

METHODS FOR STUDYING NUTRITION PROBLEMS.

The development and standardization of methods for studying nutrition problems and the devising of ways in which information that has been accumulated may be best made available to housekeepers and students have been an important part of the nutrition work. What has been accomplished in this way is applicable not only to nutrition, but also to related topics—clothing and shelter—which with nutrition make up the subject of home economics. In this work the department has done something which was recognized by agricultural experts as a public need even before the Department of Agriculture was established. It is evident that those who worked for the founding of the Department of Agriculture had in mind the desirability of studying home problems along with those of the farm, for the first report of the first commissioner of the United States Department of Agriculture, published in 1862, quotes with approval a statement made some 20 years earlier of the objects of a great national Department of Agriculture, which includes household economy as a division of agriculture in its widest acceptance, together with cultivation of the soil, orcharding, gardening, "rural embellishment, and the veterinary art." This is logical, for all food products, most of the raw materials for clothing, and many of the materials used for shelter are supplied by agriculture, and it is as important to study their use as their production, since the two are interdependent.

The Department of Agriculture not only helps the farmer to make two blades of grass grow where one grew before, but also, through its studies of the use of agricultural products as food, helps the housekeeper in her efforts to make one dollar do the work of two in providing for the family table, so that it may meet the daily requirements for food, accord with the tastes of the family, and be reasonable in cost in proportion to the family income.

IRRIGATION INVESTIGATIONS.

Sixteen years ago the farmers of the arid region were just beginning to realize the need of more scientific and technical advice in the solution of their many irrigation problems. The crude laws of the western miner when applied to irrigation were proving a misfit. Water rights were undefined, and water users were left with little protection save through costly and long-continued litigation. Again and again State legislatures tried to grapple with this difficulty, only to find at the closing hours of each session that they did not possess reliable information on which to base remedial legislation pertaining to the use of water for irrigation and other beneficial purposes.

In 1896 water was used on about six and one-third million acres in the West, but little was known of the quantities diverted or of the large losses which occurred in conveying water through earthen ditches to so many farms.

In 1898 Congress granted a small appropriation for irrigation investigations to be used wherever advisable in cooperation with western agricultural colleges and experiment stations. The collection and publication of information pertaining to the use of water in irrigation was accordingly begun, and there can be no doubt but that the expansion and continuity of this work has exerted a marvelous effect on the development of irrigation along right lines during the past 14 years. In that time the States of Nebraska, Idaho, Utah, Nevada, North Dakota, South Dakota, Oregon, New Mexico, and Arizona have adopted modern irrigation codes based to a large degree on the recommendations of this department. In all of the States named, including Colorado and Wyoming, the chaotic state of affairs regarding irrigation which prevailed 16 years ago is giving place to law, order, and system. The water records are being cleared of worthless claims, and valid rights are not only recognized but protected.

DISSEMINATION OF INFORMATION.

As conclusions of value were arrived at in regard to the use of irrigation water they were set forth in bulletins which were disseminated throughout the West. The results of these investigations have been watched closely, and it is believed that they have caused a much better understanding among irrigators of the best methods of applying water, the dangers of waste, and the actual requirements of irrigated crops. As an instance of the reform that has been accomplished in this line, the changes that have been brought about in the use of water in the Modesto irrigation district in California may be cited. In 1904 diversions by the Modesto Canal amounted to more than 13 acre-feet per acre for the land irrigated. In 1912 slightly more than 4 acre-feet per acre were used.

As the work of the investigations became better known frequent requests were made by prospective settlers in irrigated sections for information concerning the possibilities of irrigation in various Western States. To meet this demand a series of bulletins was published providing in concise form such information concerning conditions in each State as was believed to be of value to prospective settlers on irrigated lands. To meet a similar demand which came largely from farmers already irrigating, other bulletins were prepared giving advice as to the best methods and practices employed in the irrigation of crops most widely grown in the West.

Contrasting the small beginnings of irrigation investigations of this department 14 years ago with the present, one finds that the congressional appropriation has increased tenfold and that the work actually undertaken has increased in even greater ratio. The six and one-third million acres which were irrigated under private enterprises in 1896 have increased to 15,000,000 acres, and instead of being confined to the more arid portions of the country it is rapidly extending to practically every State of the Union regardless of the annual precipitation. In Louisiana, Mississippi, and southern Arkansas the rainfall frequently exceeds 50 inches per annum, yet a most remarkable development has taken place in this district in the past 16 years as the direct result of irrigation. In 1911 over 700,000 acres were seeded to rice, all of which were irrigated. This extensive acreage produced in that year over 22,500,000 bushels of rice, for which the growers received over $18,000,000. Ten years ago prairie lands in Arkansas were held and occasionally sold at $5 to $6 per acre. Now the pumping of water from wells and the profitable production of rice under irrigation has increased the price to from $50 to $90 per acre.

From the irrigated rice fields of the Gulf States the practice of irrigation has extended eastward throughout the humid region. The department is now carrying on successful cooperative experiments in the States of Alabama, Florida, Georgia, New Jersey, Maryland, Iowa, Minnesota, and Wisconsin. While the data thus far secured are incomplete they are sufficient to indicate that eventually all high-priced and intensively cultivated crops throughout the humid region will be insured against drought by supplemental irrigation.

DRAINAGE INVESTIGATIONS.

The drainage investigations of the Department of Agriculture are destined to play no mean part in the development and conservation of our natural resources. There are in the United States approximately 79,000,000 acres of land, exclusive of tidal marshes, that can not be profitably cultivated on account of excess moisture. It has been estimated that this area, comprising 52,665,000 acres continually wet, 6,826,000 acres of wet grazing land, 14,748,000 acres periodically overflowed, and 4,766,000 acres of farm land periodically swampy, could be drained at a net profit of $1,594,000,000, measured by increased land values, with an increase of annual income estimated at $273,000,000. Western irrigated lands that but recently yielded grain and fruit abundantly have been abandoned, having become swampy or incrusted with alkali. The area affected, already great, is enlarging every year as irrigation continues. The lack of natural drainage is requiring that artificial means be provided for removing the excess water and preventing a large part of the lands under irrigation from being rendered worthless.

SCOPE.

Previous to 1902 the department gave no special attention to land drainage. Now the investigations embrace a study of the requirements of drainage in various localities and under differing conditions; the collection of technical data of service to engineers and others having to do with the design of drainage improvements; and the rendering of assistance by correspondence to owners of land needing drainage, by personal consultation and occasionally by surveys with reports presenting detailed plans for the requisite improvements. The construction work, however, is done by the landowners to be benefited. Investigations have been conducted in nearly every State. The total area surveyed is approximately 8,800,000 acres, classified as follows: Subject to periodical overflow, 4,110,000 acres; continually wet, 3,550,000 acres; requiring new or improved outlet channels, 760,000 acres; farm lands needing complete drainage, 20,000 acres; irrigated lands, 360,000 acres.

RESULTS.

As the result of the department's work there has developed a very active interest in the drainage of the swamps and other wet lands of the coastal plain, from Maryland to Texas. Drainage engineers of the Office of Experiment Stations have examined a large part of those areas, preparing plans for more than half a million acres.

Tracts of the fertile wet prairie lands of the Louisiana gulf coast are being surrounded by embankments and drained by means of pumps. This development will ultimately involve problems equal to those of reclaiming the lowlands in England and Holland.

Communities embracing large overflowed areas in the Missouri and Mississippi Valleys are organizing and constructing drainage improvements. The levees along the lower Mississippi River have in some measure complicated the drainage problems there, as they make it necessary to divert waters from their natural channels and discharge them at considerable distances farther down the valley. No little judgment is required to devise drainage systems that will be economical and efficient, at the same time subdividing the natural drainage units into such parts that the necessary cooperation of the landowners can be secured to complete the work of reclamation.

SEEPAGE AND ALKALI.

The injury to irrigated lands from seepage and alkali has undoubtedly been hastened in many instances by the unnecessarily lavish use of water, but except where soil conditions are unusual, the same effects, in a modified degree, will follow sooner or later even with the greatest economy of irrigation. Not all the water applied can be retained in the root zone of the plants; the balance percolates downward until checked by some impervious stratum, accumulating until the plane of saturation is raised sufficiently to render the ground surface swampy in the lower places.

Injurious salts in solution may be carried to the surface by capillarity, and there deposited as the water is evaporated, even when the ground is not saturated to the surface. The investigations have determined that while methods of drainage used in the humid sections are often valueless in the irrigation region, seeped lands can be reclaimed by drains properly designed and installed. The drains are usually laid at considerable depth to intercept the underflow from higher lands. Relief wells may be below the drains to offer the water an easy passage upward from a loose underlying stratum, rather than above the drain to admit surface water. Each irrigated tract requires a study of subsurface soil and water conditions, such as is not considered in drainage east of the one-hundredth meridian.

COLLECTION OF TECHNICAL DATA.

The collection of technical data is an important part of the drainage investigations. This includes determining the quantity of water to be removed and how it is affected by rainfall, topography, soil, vegetation, and size of watershed area; the capacity of drainage channels under various conditions of smoothness and of uniformity of cross section; the special requirements for draining muck and peat soils;

the conservation of soil on hillsides; and the proper depth, spacing, and arrangement of open ditches and tile drains for the various kinds of soils. In the irrigated region special study is made of the movement of ground water and of the effectiveness of drainage in removing alkali. While definite quantitative results in some of these lines must wait upon further investigations, the data already obtained have enabled invaluable advice to be given with respect to particular projects.

LIBRARY.

LARGEST COLLECTION OF AGRICULTURAL LITERATURE.

The growth of the library during the past 16 years has more than equaled its growth during the previous 34 years of its existence. In 1897 it contained approximately 59,000 books and pamphlets, while to-day its collections number 122,000 books and pamphlets. The library at the present time contains the largest collection of literature in this country on agriculture and related sciences, and as far as known is the largest agricultural library in any country.

In the subject of American agriculture, including horticulture, forestry, pomology, dairying, live stock, poultry, agricultural statistics, and the various agricultural crops, it is especially complete. In addition, it has a large and representative collection of the most important foreign agricultural books and periodicals and a collection of the publications of foreign agricultural institutions, societies, and experiment stations, which is without question the largest and most complete in the United States. In the sciences that relate to agriculture, such as botany, chemistry, and zoology, the library's resources compare favorably with the resources of the large college and reference libraries of the country in these subjects, and along economic lines are probably unsurpassed.

It is especially strong in scientific and technical periodicals and society publications. Nearly 2,000 periodicals are being received currently, of which number a little less than two-thirds are sent as gifts and exchanges.

CATALOGUES.

Since 1897 the appropriation for the library has been increased from $13,960 to $40,500, and the staff has grown from 6 to 29. There has been a corresponding increase in the activities and usefulness of the library. Only a comparatively small portion of the library was catalogued in 1897; to-day the dictionary card catalogue, containing approximately 286,000 cards, includes entries for nearly all the books in the library and is an invaluable key to the literature of agriculture and the related sciences. In 1899 the issuance of a card catalogue of the publications of the department was begun by the library. It was, as far as known, the first attempt on the part of any institution to furnish to the outside world a complete printed card catalogue of its publications. The service in printed cards was still further increased in 1902, when the printing by the Library of Congress of the catalogue cards for accessions to this library was begun, the library of the department being the first of the department libraries to cooperate in this way with the Library of Congress.

In addition to issuing these printed cards, the library has made its resources better known by printing separate catalogues of publications relating to botany, forestry, irrigation, and entomology, and lists of its periodicals. It has also published regularly a bulletin of its accessions.

In 1897 the library occupied the large room on the second floor of the main building into which it had been moved 10 years previously, and it continued to occupy this room until 1908, when, on the completion of the new laboratory buildings, it was moved to the ground floor of the east wing. The rooms being designed for laboratories are not well fitted for library use, but it is a matter for congratulation that the library is now stored in a fireproof building, as it would mean an almost irreparable loss to the department if the library's collections were destroyed.

INCREASING USE OF LIBRARY.

With the growth of the department in the past 16 years the use of the library has increased more than 500 per cent. Its usefulness to the State agricultural colleges and experiment stations has also been greatly extended. Whereas only an occasional book was formerly borrowed by an agricultural college or experiment-station worker, during the past year 620 books were lent to workers in 39 different States and Territories, in range from Maine to Hawaii and from Oregon to Florida and Porto Rico. By increasing and perfecting the library's collections, in order that it may more fully meet the demands made upon it and by making its collections and services widely useful, the library is from year to year performing more and more the duties of a national library of agriculture.

FOREST SERVICE.

PREVIOUS ORGANIZED ACTION.

Forestry in the United States at the beginning of 1897 was still in its dark ages. Its general practice seemed about as imminent as when Columbus first set foot upon the shores of a new world. A few far-sighted and public-spirited men had tried from time to time to arouse realization of the danger that lay ahead if wasteful destruction of a great primary resource were not checked; but they were as voices crying in the wilderness. Their warnings were, on the whole, rather less productive of results than had been similar warnings in colonial days.

Unquestionably one reason why predictions of direful consequences in store if waste were not curtailed aroused little interest was the fact that the cry of "wolf" was so old. The history not merely of agitation but of legislation with regard to forests reaches back into the early days of settlement along the Atlantic coast. Laws for the care and protection of forests were placed upon the statute books of several of the Colonies.

Late in the eighteenth and early in the nineteenth century agricultural societies in Massachusetts and New York acted on behalf of forest protection and promotion of the growth of forests. Between 1799 and 1831 Congress legislated again and again with a view to insuring the maintenance of supplies of live oak. In 1867 horticultural and agricultural societies in Wisconsin appointed a committee to report on the results of forest destruction. Laws for the encouragement of tree planting were passed between 1868 and 1874 in nine Western and two Eastern States. In 1869 the board of agriculture of the State of Maine took action toward the formulation of a forest policy. Arbor Day was instituted in 1872. In 1873 Congress passed the first timber-culture act. The American Association for the Advancement of Science appointed in the same year a committee to memorialize Congress and State legislatures upon the importance of promoting the cultivation of timber and the preservation of forests. The American Forestry Association was founded in 1872 and the Pennsylvania Forestry Association in 1876. The latter year marked the inauguration of forest work by the Department of Agriculture.

These are scattered examples of organized action to meet either a recognized or a supposed danger. That forest destruction was proceeding apace and threatened serious consequences had been the declaration of some observers from early days down. Those who govern their course by rule of thumb instead of by a careful analysis of conditions, and therefore hold that only what has happened will happen, were inclined to be more than skeptical concerning the existence of this particular wolf. The alarm had been raised too often. Cassandra prophecies of the approach of a timber shortage were generally received with tolerant incredulity when they did not call forth outspoken contempt.

FEAR OF WOOD FAMINE IS RECENT.

The opinion was still commonly advanced that the forests of the country were inexhaustible. Practical men who had had sufficient opportunities of observation to know the contrary were content in the thought that the supply would last their time. Such an attitude was the more readily justified by the fact that no matter what convictions were held on the subject there appeared to be nothing in particular that anybody could do about it. Economic conditions were thought not ripe for a change. Wasteful exploitation must run its course, it was argued, and a great national asset continue to vanish in smoke until the price of protection became worth while and until the market value of a tree made growing it good business.

It may fairly be said that half a generation ago the fear of a wood famine was a matter that had not entered the field of vision of the average man. Some sagacious ones, it is true, were giving practical but unostentatious evidence of their capacity to see ahead by gathering into their ownership all the cheap timberlands that they could acquire. Thus were laid the foundations of great fortunes. Timber reservations by no means began with the Government. The proceeds of lumbering in the virgin forests of the Northeast and in the matchless Lake State pineries, once Government owned, were often reinvested in southern yellow-pine lands or in the cream of western timber. This, however, was foresight exercised for private ends. Those who put their money into such investments counted—and with reason—on diminishing supplies to force up the value of their holdings. But those who urged the necessity of public action to provide for future public needs were thought to be disturbing themselves unduly in matters which were proper subjects for the attention of Providence rather than of men. To concern oneself overmuch lest wasteful use of the resources placed at human disposal might leave posterity with nothing to use argued a lack of confidence in the Divine wisdom which had put us in a world designed for the satisfaction of all essential needs. If the forests should ever fail, there would be something better to take their place.

This optimistic point of view was fostered by the very circumstances which in reality gave greatest cause for apprehension. Unexpected and momentous changes had revolutionized the conditions on which had been predicated the early forecasts of approaching need. While by falsifying these forecasts they had operated to lull the public mind into a feeling of unjustified security, they had actually created a situation a hundredfold more serious than before. In the eighteenth and early nineteenth centuries the question of forest supplies was purely local. Transportation except by water for any great distance was out of the question for so bulky a commodity.

AWAKENING TO THE PROBLEM.

With the development of railroads affairs took on a wholly new aspect. Continental supplies were substituted for local. In the mid century the forests about the Great Lakes began to melt away, going east, west, and south, to rise again in the countless homes of an expanding nation. From open prairie to seaboard cities, from the factory towns and hamlets of New England to the growing commercial centers and the multiplying crossroad villages of the Middle West, they fed prosperity, and fireswept desolation blotted the land of their origin.

Thus was created a problem which is now not nation wide, but world-wide. New York bids against South America and the Orient for the timber of the Pacific Northwest. Southern pine goes by water from the Gulf to Great Britain or the North Atlantic States; by rail, to meet the output of Montana's forests on the plains. In 1911 the United States exported domestic forest products to a total value of over $100,000,000, of which Europe took over $55,000,000 worth and South America about $25,000,000 worth. All the countries of eastern Europe must import timber to meet the excess of their needs over the home supply. Meanwhile, with an estimated home consumption of 23 billion cubic feet of wood annually, our depleted and abused forests are producing by growth probably less than 7 billion feet. The Bureau of Corporations of the Department of Commerce and Labor estimates the existing supply of saw timber in the United States at less than 3,000 billion board feet, which is equivalent to about 500 billion cubic feet. Economists now recognize that, taking the world over, wood consumption exceeds its growth, and that a crisis approaches.

That some measure of public provision has been made for maintained supplies of a great public necessity; that we are not merely 16 years nearer the time when wood shortage will handicap building, mining, and manufacturing, the railroad, the merchant, the farmer, the wage earner, and the consumer; that one-fifth of the standing timber in the United States is not only held and protected in national forests, but also open to use under methods which will mean increasing production through growth and successive harvests for all time; that the public is fully awake to the importance of preventing forest fires everywhere, and of substituting forest management for forest exploitation; that private owners recognize in forestry not an impracticable counsel of perfection and a fad of theorists but a tangible business proposal; that lumbermen show a growing realization of the fact that their industry is one affected with a public interest, and therefore involving a public responsibility; that immense gains have been made in reduction of waste and increased length and amount of service obtainable from what is cut; that conservation of natural resources has become an accepted public policy and a clearly perceived matter of national welfare—all these are results primarily and directly due to the work of this department within the last 16 years.

Solely to that work is due the fact not only that the great bulk of the national forests were ever set aside, but also that the justifiable demand for the supply of immediate needs has not been confronted by a flat taboo upon use which would have meant the abandonment of reservations already made. Solely to that work, again, is due the fact that the practice of technical forestry in the United States has been made possible by the gathering through the years of the basic scientific knowledge on which alone good practice can be founded. Had this great work not come when it did, most of our remaining publicly owned forests would have passed forever from public possession and private monopoly would now be forging its fetters with no prospect of relief save by the slow and difficult procedure of legislation in the face of vested rights. In 1905 I wrote:

> Seven years ago there were in the whole United States less than 10 professional foresters. Neither a science nor a literature of American forestry was in existence, nor could an education in the subject be obtained in this country. Systematic forestry was in operation on the estate of a single owner, honorably desirous of furnishing an object lesson in an unknown field. Lumbermen and forest owners were skeptical of the success of forest management, and largely hostile to its introduction. Among the public at large a feeling in favor of forest preservation, largely on sentimental grounds, was fairly widespread, but almost wholly misinformed. It confounded use with destruction, shade-tree planting with forestry.
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> The real need of forestry was urgent. A time had come which presented at once a great opportunity and a dangerous crisis. Forest destruction had reached a point where sagacious men—most of all, sagacious lumbermen—could plainly discern the not distant end. The lumber industry, vital to the Nation at large, was rushing to its own extinction, yet with no avenue of escape apparent until forest management for future crops should be forced by famine prices. Meanwhile, however, the ruin would have been wrought already.
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> Timberland owners were selling their holdings or their stumpage with little evidence of an understanding of their future values, and lumbermen were compelled by business competition to keep down the cost of operation to the lowest terms or market their product at a loss. Forestry was both an evident economic need and an apparent economic impossibility. Few well-informed persons believed that the obstacles to its introduction could be overcome sufficiently to bring it into common practice among private owners during the lives of the present generation. That the whole situation is profoundly altered is directly and chiefly due to the work of the Forest Service.
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> Forestry is a matter of immediate interest to every household in the land. Forest destruction is no imaginary danger of a distant future. If it is not speedily checked, its effect will sooner or later be felt in every industry and every home. To make these facts known is a national duty. The work of education must continue until public opinion will not tolerate heedless waste or injudicious laws.

These words are no less true now than when they were written, except for the fact that the record of progress has been materially enlarged. In retrospect one central fact stands out—that the key to the whole situation was seized when the practice of forest conservation was shown to involve not the rearing of blind barriers against the utilization of resources, but the development of resources through wisely regulated use. For passive prohibitions were substituted constructive activities.

USE OF NATIONAL FOREST RESOURCES.

The era of mere reservation culminated when President Cleveland, at the close of his administration, more than doubled in a day the total area covered by withdrawals under the act of March 3, 1891. That act empowered the President to set apart "public lands wholly or in part covered with timber or undergrowth, whether of commercial value or not, as public reservations." With the Cleveland additions the forest reserves totaled, on the 4th of March, 1897, not quite 40,000,000 acres.

For use of these forests no provision whatever had been made. The land was theoretically closed to all human occupation or enjoyment. In consequence an outburst of indignant protest from the West demanded that the newly created reserves should be restored to the public domain. Instead, the proclamations were suspended for a year and the act of June 4, 1897, passed. By authorizing regulated use of all national forest resources this act laid one of the two main foundations on which rests the present system of administering the forests. The second and no less necessary foundation was provided by the work inaugurated in this department one year later.

LACK OF KNOWLEDGE IN 1897.

It is difficult to realize in 1912 how completely lacking in 1897 was the knowledge necessary for the application of forestry in the United States. Almost no field studies of consequence had ever been made. The Division of Forestry, as it existed in my department when I took office, employed all told 13 persons, of whom 5 were clerks and 1 a messenger. It was a bureau of information and advice merely. It had no field equipment. It was supported by an annual appropriation of $28,520. How its work was regarded may be judged by the fact that Congress, in making this appropriation for the year 1899, attached a provision that the Secretary of Agriculture should make at the beginning of the following session a special and detailed report "upon the forestry investigations and work of the Department of Agriculture, showing the results obtained and the practical utility of the investigations."

SUBSEQUENT POLICY.

Early in the fiscal year 1913 the Forest Service employed a total of 4,097 persons. Its appropriation for the current year is over $5,000,000. Its field of work is the entire United States. Its administrative and protective duties alone (including cooperation with

States in the protection from fire of lands on the watersheds of navigable streams) are discharged in 34 States of the Union and in Alaska. The printed results of its investigations are among the publications sold in largest numbers by the superintendent of public documents, while the Department of Agriculture printed for distribution without charge, between July 1, 1897, and June 30, 1912, a total of 12,601,450 copies of Forest Service publications.

In mere size, therefore, as indicated by expenditures, the Division of Forestry of 1897 compares with the Forest Service of 1913 in about the ratio of 1 to 200, and as indicated by personnel in the ratio of 1 to 372. An announcement in the annual report of the division for the fiscal year 1897 formed the point of departure for this great expansion. A radical change in the character of the work planned was then made. This change may be put in a word: The field of activities was shifted from the desk to the woods.

Private owners of woodlands were offered an opportunity to obtain practical advice and assistance looking toward the introduction of forest management on their holdings. The response was immediate, and swiftly swelled. The area for which such advice had been asked by the close of the fiscal year 1898 was nearly 1,000,000 acres; of 1900, nearly 2,500,000 acres; of 1905, nearly 11,000,000 acres. Examinations actually made had, in 1905, covered about 4,000,000 acres. Eight years of work had fairly launched the forest movement.

The offer of advice to forest owners had for its ends investigation, demonstration, and education. Forest management is first of all a matter of practice, just as is the management of a farm. Both farmer and forester must base their practice on knowledge, and to that end knowledge must be gathered. Nevertheless, the final object is not to learn, but to do. In order to advise and assist owners who were contemplating forest management, the Division of Forestry had first to create a body of knowledge on which to base both plans of procedure having definite objects in view and estimates of the yield which might be expected under these plans; and, further, it had to devise practicable methods for carrying out these plans and to calculate what carrying them out would cost. In other words, it had to create a science, develop a technique, and work out business conclusions all at once. It succeeded because the fact was firmly grasped that the forester must not be primarily a scientist, but a director of operations. As capacity along this line was developed it was proposed to demonstrate to individual private owners how to make forestry pay, and thus to secure educational examples which other owners might follow.

As it proved, the greatest result gained was the gathering and training of a corps of technical foresters qualified by the character of their experience to assume charge of the management of the national forests. The date on which, early in 1905, administrative jurisdiction over the forests was transferred to me divides the 16 years, 1897–1913, into two eight-year periods, of which the first was that predominantly of investigations, preparation, and public education, and the second predominantly of administrative activities. Yet entirely apart from the fact that the work of the earlier period made public forestry possible in the United States, it yielded results of enormous value in actual improvement of lumbering methods and widespread introduction of forest protection.

At the close of the nineteenth century lumbermen everywhere in the United States were operating with a disregard of waste inherited from days of more abundant supplies and lower prices. Stumps were cut high, marketable saw timber was left in tops, and merchantable logs were left in the woods. Further, the value of young growth not yet merchantable and the money sacrifice involved in cutting small-sized timber which, if left for a later cutting, would make rapid increase in size and value, were almost unrecognized. The first fruits of cooperation between the foresters of this department and private owners who sought their advice were accurate computations of what was to all intents and purposes money thrown away, that startled into instant attention practical woodsmen who had previously considered themselves abundantly familiar with their own business. The mere saving of unnecessary waste in lumbering was, indeed, not forestry; but the demonstration that it afforded a neglected opportunity for profit was both a material gain for forest conservation and an open sesame for the forester standing without the door of a great established industry whose practices he sought to revolutionize.

From the north woods of New York and New England to Texas and into the far West swept the new gospel of closer utilization. With or close behind it went the turning of attention to the value of immature timber in the present stand. Operators began to reckon on returning for a second and even a third cutting. Such a policy involved of necessity consideration of the fire risk. Agitation for organized fire protection by States began. The number of private owners of timberland in large holdings who have entered definitely on the policy of permanent wood production is as yet infinitesimal, but the number of those who have adopted some substitute for the old policy of immediate devastation and indifference to what may follow is very large. This in itself is a result of the utmost importance from the standpoint of the public welfare. To it the work of the division and later the Bureau of Forestry, now become the Forest Service, directly led.

Prior to 1897 the only State in which the forest question had received any material recognition was New York, which had established State reservations in the Adirondack and Catskill Mountains and had inaugurated a system of fire protection for them, but along lines incapable of yielding effective results. In May, 1897, Pennsylvania enacted the law under which a policy of forest reservations was inaugurated for that State. Unlike New York, Pennsylvania did not adopt restrictions which closed these reservations against any actual practice of forestry upon them, but it had neither field work nor field force. There was no professional forester in the employ of any State in the Union. There are now 20 such State foresters. Thirty-three States have enacted laws shaped in the light of the knowledge made available by the work of the Department of Agriculture. Thirty-one States have sought and received the assistance of the department in the study of their forest problems. The entire movement for State forestry is the outgrowth of the work done by this department in the last 16 years, with the single exception of the movement in the State of Pennsylvania; and even there, though independently and ably led, most of the progress made could hardly have come about had there been no national movement to help it along.

Hand in hand with the creation of the science and development of the practice of American forestry, the awakening of the country at large to the issues involved and the crystallizing of sentiment into definitely formulated public policy, went the promotion of more economical use of the material drawn from our forests. To make what we have go further was equivalent to an augmentation of the supply. Study of the whole problem of utilization was pressed into varied fields.

PRESERVATIVE TREATMENT OF WOOD.

The preservative treatment of wood against decay was in 1897 practically unknown in the United States. Investigations to show what would be the money gain to the railroads through lowered costs of maintenance if ties were treated to prolong their life, and what form of treatment would prove most advantageous, were begun in 1903. To-day one-fourth of the ties used in the United States are given treatment and the number treated increases yearly, while another large fraction gain greater durability through recognition of the value of proper seasoning, as developed by our investigations. Methods of preservative treatment suitable for the use of farmers, whose fence post needs create in the aggregate an immense demand for material, have been devised. Telephone and telegraph companies are beginning to treat their poles and mine operators their timbers. This is but a single example of the way in which economies have been made possible. One or two others may be briefly mentioned; but an exhaustive list even of the leading achievements in this general field can not be entered upon here.

TURPENTINE.

In 1902 a method was devised whereby it has become possible to secure a materially larger yield and better quality of crude turpentine, with indefinite prolongation of the formerly brief period of years during which the crude material of the naval-stores industry could be gathered from the same trees. Commercial operations on the Florida National Forest have demonstrated that the naval-stores industry may be perpetuated, instead of being destroyed through the wasteful methods which have removed the industry from the Carolinas where it started. At the same time a vast new field of future naval supplies has been indicated through experiments conducted on national forests in Arizona, California, and Colorado, which have shown that western yellow pine may be utilized to supplement the pine forests of the Southeast as producers of turpentine and rosin.

STRENGTH OF TIMBERS.

Another great gain has been made through better knowledge of the strength of the various kinds of timbers used in construction and of the physical properties which determine the use to which woods may be put. While some strength tests of timbers had been made prior to 1897, the results had little applicability to construction work. Since 1902 systematic and exhaustive study of this subject has been under way, covering practically all native species of commercial importance. Tests on the woods themselves and upon wood products have led to utilization of various species formerly disregarded and to large economies in consumption.

NEW WOODS FOR PULP.

From 1897 to 1913 the consumption of wood for pulp quadrupled. At the beginning of this period three-fourths of all the pulp was spruce, and less than one-fourth of it was imported. Now, with an annual consumption of about 5,000,000,000 cords, 40 per cent is spruce, and about half is imported. In this period the price of spruce doubled. Exports of wood pulp have fallen off and imports have increased fourfold. These figures point to the fact that if the United States is to furnish its own supply of wood pulp it must do so from substitutes for spruce. Tests made by the department show that pulps of commercial value suitable for news and wrapping paper can be made by the sulphite process from eight native woods, several of which grow in quantity on the national forests. Some of these woods are beginning to be used to a limited extent. The department's activities also have proved that native species, large quantities of which are available and cheap in the Lake States, can be substituted for spruce in the ground-wood process for news print paper. As a direct result of these experiments several mills have begun grinding these woods. Moreover, the department has demonstrated in its paper laboratories, which work under conditions comparable with those of practical manufacturing plants, that efficiency in pulp making can be raised far beyond that which obtains in the ordinary plant.

WOOD DISTILLATION.

In wood distillation the department has demonstrated that commercial yields of acetate of lime and wood alcohol can be obtained from various new woods and from mill waste of these woods. It has also demonstrated that a yield of acetate of lime more than one-half greater than the present can be obtained. There is now being installed in the forest-products laboratory a still of special design, contrived by our investigators for the production of ethyl alcohol from wood waste. Only the methyl or wood alcohols are now so produced. There is wasted in the United States each year 6,000,000 tons of slabs, edgings, and sawdust, each ton of which is capable of yielding 15 gallons of alcohol, if the proper commercial process can be developed.

KILN-DRYING.

In the artificial seasoning, or kiln-drying, of lumber, lack of scientific knowledge of what is involved and of accurate control of the methods used has been a cause of heavy loss. The average amount of material rendered unfit for use in kiln-drying is 3 per cent for softwoods and 10 per cent for hardwoods, which means a money loss of millions of dollars annually. After years of study the department has arrived at such a knowledge of the theory and practice of drying lumber as makes possible a dry kiln in which temperature, circulation, and humidity of the air are under control of the operator. This solves the fundamental problem.

FOREST RESOURCES.

When the twentieth century opened the actual situation with regard to forest supplies was a matter of entire uncertainty. The census had published figures of lumber production at successive 10-year intervals, but there was no knowledge of what supplies the country possessed or of the rate at which those supplies were replenished by growth. In 1907 the Forest Service brought together from all existing sources of information its first estimate of our actual forest resources. This stock taking was carried further in the reports prepared for the Conservation Commission. These figures, combined with the figures of annual consumption, collection of which began in 1905, showed for the first time to all the danger of an impending timber shortage.

FOREST PRODUCTS LABORATORY.

The major part of the investigative work to promote better use of what our forests furnish is now conducted at the forest-products laboratory which has been developed at Madison, Wis. The facilities for scientific research provided by this laboratory are unexcelled in any country, and the building up of this instrument of research is in itself an achievement of no mean importance. Results are being attained which mean a lessened drain upon our forest supplies through more economical use of material, the opening of new sources of supply for various industries, the utilization of every kind of wood for the purpose to which its intrinsic qualities best adapt it, a greater incentive to the practice of forestry because of the increased returns made possible, better adjustment of wood-using industries to meet the conditions created by past use without forethought, and a general clarifying of the situation with respect to our forest resources and requirements through accurate knowledge of what these requirements are and what is available to fill them.

PROBLEMS OF MANAGEMENT.

But by far the greatest achievement of the 16 years in forestry has been the working out of the national forest policy provided for by the act of June 4, 1897. This achievement is, indeed, one of the notable events in the recent history of the country. It may fairly be expected to remain an enduring milestone of progress and a matter of permanent importance. Without mention of it, no future account of the first decade of the twentieth century will be complete.

The act of June 4, 1897, conferred upon the Secretary of the Interior every authority and power necessary for managing the national forests in accordance with the principles of practical forestry. Funds for this purpose were first made available for the fiscal year 1899. An administrative force, consisting of superintendents, supervisors, and rangers, was thereupon organized. It shortly became apparent, however, that the task of opening the forests to wise use and of developing their resources effectively was one for which the department then in charge was not well equipped. Accomplishment of this task demanded not only authority in law but also technical knowledge constructively applied. In so far as there existed at that time any technical knowledge at all of the principles of forest management, it was in the small but energetically working and rapidly growing Division of Forestry in this department. The result was that on December 7, 1899, the Secretary of the Interior made a request upon me for technical advice regarding the management of the forests.

During the next five years such advice was given, to the extent of the resources available. Field parties were sent out to study the forest conditions and gather the data necessary for the preparation of plans of management. The fundamental problem was to know how use might be so regulated as to insure perpetuation and even improvement of the resources concerned, along with the largest immediate returns consistent with permanence. There were recognized three major resources to be both used and safeguarded—timber, water, and range.

The most immediately urgent part of the problem was, on the whole, that relating to the range. Because of the harm done both to forest growth and to water flows by overgrazing, all these resources were to some extent at stake; grazing could not be dealt with as a matter of forage production solely. From the nature of the range-stock industry and because of the general economic conditions which existed throughout most of the West, it had come about that while the demand for national-forest timber was exceedingly restricted and almost entirely local, the forage crop was almost everywhere in great demand. Sheep and cattle competed with each other for the summer feed found in the forest-clad mountains, and rival sheepmen and cattlemen competed among themselves. Much of the range had become so overcrowded as to cause serious impairment of its carrying capacity, and the evil was thus accentuated. Progressive deterioration threatened to wipe out both the forage resource and most of the stock industry dependent upon it. Hand in hand with range depletion went damage to water supplies, inflicting hardships upon settlers in the valleys and imperiling the welfare of great regions. Forest growths also were seriously affected. The belief was common that conditions required the exclusion of all sheep from many, at least, of the National Forests.

In the first year or two of administrative control, however, a policy of regulation was entered upon. Largely as a result of the expert advice given by scientifically trained men of this department, the beginnings of systematic grazing control were developed. It was obvious that only specialized knowledge of range vegetation and of grazing methods could constitute a basis for devising such an adjustment of use to existing conditions as would serve to restore the carrying power of the range without undue disturbance of the established stock industry. Experience soon proved that mere assistance in devising an administrative policy was not adequate to meet the needs of the situation. Expert knowledge was needed also in carrying the policy into effect. It was perception of this fact which led the Commissioner of the General Land Office and the Secretary of the Interior to urge the transfer of the National Forests to the Department of Agriculture. In his annual report for 1903 the Commissioner of the General Land Office said:

> The work of establishing a forest service for the care and administration of the reserves * * * has been developed along such practical lines as fall within the province of the Interior Department. The experience of these five years abundantly testifies to the need for efficient work of a scientific character. The dangers to which the reserves are exposed from fires, timber depredations, and other sources make the establishment of an efficient protective force a matter of great importance. Following closely upon that, however, must come the application of scientific methods in dealing with the many and various forest problems in connection with the various industries affected thereby. * * * Elementary efforts need to give way in the course of development of such a system. It would seem, therefore, that the point has been reached when the work should be committed to the care of men who have had the scientific and practical training needed to cope with work involving such far-reaching issues. The Bureau of Forestry of the Department of Agriculture is properly organized and equipped to carry on this branch of the work.

Recommendations to the same effect were repeated the following year. An act of Congress, which became law on February 1, 1905, effected the transfer.

STATISTICS OF USE OF THE NATIONAL FORESTS.

The salient fact disclosed by the statistics of use of the forests since that time is the immense acceleration affected by the transfer in the rate at which the resources were made available. In 1905 there were issued not quite 8,000 grazing permits; in 1912, over 26,000. The 1905 permits were for approximately 600,000 cattle as against 1,400,000 in 1912, 60,000 horses as against 95,000, and less than 1,800,000 sheep as against nearly 7,500,000. In 1905 the number of timber sales made was about 400; in 1912, nearly 5,800. The 1905 sales covered about 100,000,000 board feet, while those of 1912 covered 800,000,000 board feet; and the receipts from timber sales rose from less than $86,000 in 1905 to over $1,000,000 in 1912. In 1905 not quite 3,400 free-use permits were issued; in 1912, nearly 40,000. These permittees in 1905 took from the forests free of charge the equivalent of about 27,000,000 board feet; in 1912, over 123,000,000. In 1905 less than 300 applications for special-use permits were granted; in 1912, nearly 5,000. It is true that in comparing these figures allowance must be made for the fact that on June 30, 1905, the total area of the National Forests was less than 86,000,000 acres as against over 185,000,000 acres on June 30, 1912; but with all allowances made the evidence remains impressive and overwhelming. The application of technical management is the master key that is everywhere unlocking the old-time reserves to the public, developing their resources, and demonstrating the methods by which, under public control, they can be made to contribute most fully to our permanent economic welfare.

Time altogether fails in which to set forth even cursorily what has been done on the National Forests. From long before the transfer the principal source of information concerning the lands suitable for inclusion in forests by presidential proclamation was the Bureau of Forestry. In gathering that information the foresters of the department raced against a swarm of timber cruisers in private employ. A corps of efficient public servants has been built up. Business methods serving the convenience of users have been worked out. A protective system of high efficiency now makes the forests as nearly safe against fire as the too small force and too meager development of means of communication and transportation permit. All in all, as a great constructive accomplishment the National Forests and the administrative system under which they are made to serve their rightful part in our national economy deserve to rank, and will rank, among the notable triumphs of this generation.

ADMINISTRATIVE BOARDS.

THE REFEREE BOARD.

On February 20, 1908, the Secretary of Agriculture appointed Dr. Ira Remsen, president of Johns Hopkins University; Dr. Russell H. Chittenden, dean of the Sheffield Scientific School, Yale University; Dr. John H. Long, of Northwestern University; Dr. Alonzo Taylor, at that time of the University of California, but now of the University of Pennsylvania; and Dr. Christian A. Herter, of Columbia University, as consulting scientific experts of the Department of Agriculture, and four days later organized them into what is known as the Referee Board. Dr. Herter has since died, and he has been succeeded by Dr. Theobald Smith, of Harvard University.

This board was appointed because a number of large manufacturers of articles of food requested President Roosevelt to select a number of disinterested, scientific men competent to pass upon the question as to whether sulphur dioxid, saccharin, and benzoate of soda are harmful when used in foods. These manufacturers assured the President that they would discontinue the use of these substances in food if such a board found them to be harmful. President Roosevelt corresponded with the presidents of some of the leading universities in the country as to what men were best qualified to make the necessary investigations as to the substances that were harmful or injurious to health when used in foods, and personally selected the five men who were appointed members of the board.

It is the duty of the board to consider and report to the Secretary of Agriculture the wholesomeness or deleterious character of such foods or such articles used in foods as may be referred to them by the Secretary of Agriculture.

The committee of the House of Representatives which considered the pure-food bill subsequently enacted into law apparently contemplated the employment of eminent scientists to advise the Secretary as to the harmfulness of substances in foods, because the view was expressed in the deliberations of the committee that the Secretary should be allowed a free hand in selecting experts on questions of the wholesomeness of certain foods and the articles used therein. Congress, in the Agricultural appropriation bill, evidently indorsed this view, for this bill contained a provision authorizing the Secretary of Agriculture to employ such assistants as he might consider necessary to secure the enforcement of the law. In his opinion of April 14, 1909 (27 Opinions, 301), the Attorney General held the appointment of the members and the organization of these members into a board to be legal.

There may be questions arising in the administration of the food and drugs act on which the Secretary of Agriculture may desire an opinion independent of that expressed by the Bureau of Chemistry, as is the case when a great number of food manufacturers of the country claim that the opinion of the Bureau of Chemistry is at variance with the scientific knowledge of the present day.

The questions as to the harmfulness of the use in foods of the following substances were referred to the referee board: Benzoate of soda, saccharin, sulphur dioxid, alum, and sulphate of copper. The board has reported on three of these questions—that is, on the use of benzoate of soda, saccharin, and sulphate of copper—and the other questions are still pending before it. In arriving at conclusions on questions submitted to them the board must make original investigations, and on the questions determined independent original investigations were made by several members of the board.

BOARD OF FOOD AND DRUG INSPECTION.

In 1907 a Board of Food and Drug Inspection was organized in the Department of Agriculture to assist the Secretary of Agriculture in the administrative work connected with the enforcement of the food and drugs act of June 30, 1906. The duties of this board as defined in General Order No. 111 creating it are as follows:

> * * * The board will consider all questions arising in the enforcement of the food and drugs act of June 30, 1906, upon which the decision of the Secretary of Agriculture is necessary, and will report its findings to the Secretary for his consideration and decision. All correspondence involving interpretations of the law and questions arising under the law not theretofore passed upon by the Secretary of Agriculture shall be considered by the board. The board is directed to hold frequent meetings at stated times, in order that findings may be reported promptly.
>
> In addition to the above duties, the Board of Food and Drug Inspection shall conduct all hearings based upon alleged violations of the food and drugs act of June 30, 1906, as provided by regulation 5 of the Rules and Regulations for the Enforcement of the Food and Drugs Act, approved October 17, 1906.

This board has conducted a large number of hearings on cases of alleged violations of the law and has considered all cases reported by the Chief of the Bureau of Chemistry as being in violation of the law. In addition the board has conducted an extensive correspondence relating to the application of the law to various products and the complex questions arising in the interpretation of the law.

From time to time the board, with the approval of the Secretary of Agriculture, issues decisions defining the attitude of the department on questions relating to the application of the law to the food and drug industries. These decisions serve as a guide to the officials in charge of the enforcement of the law and acquaint the manufacturers, jobbers, and dealers with the attitude of the department in these matters.

SOME OF THE IMPORTANT DECISIONS.

Among the important decisions so far issued, in addition to those decisions merely explaining in greater detail and amplifying the regulations, may be mentioned the following:

(1) Prohibiting the use of coating of any kind on rice if the product "be mixed, colored, powdered, coated, or stained in a manner whereby damage or inferiority is concealed," and providing in any case that rice when coated in any manner should be labeled with the name of the extraneous substances used. (2) Restricting the use of coloring matter in food products to certain harmless vegetable colors which can only be used after having been tested and approved by the department. (3) Prohibiting the use of all chemical preservatives that are known to be harmful, and requiring that when any preservatives are used the fact of their use must be stated on the label. (4) Prohibiting the bleaching of flour with nitrogen peroxid. (5) Prohibiting the use of shellac and other gums for coating chocolates and other confections. (6) Restricting the sale of canned goods which contain salts of tin derived from the solvent action of the contents of the package upon the tin coating. (7) Prohibiting the shipment in interstate commerce of green, immature citrus fruits which have been artificially colored by holding in a warm, moist atmosphere for a short period of time after removal from the tree. (8) Prohibiting the use of saccharin and copper sulphate in foods. (9) Prohibiting the importation of and interstate commerce in absinth.

These are only a few illustrations showing the nature of the decisions of the board. The decisions are published when issued and are distributed to the trade or any interested parties.

INSECTICIDE AND FUNGICIDE BOARD.

Responding to a growing demand by agricultural interests and manufacturers for Federal control of interstate commerce in insecticides, Paris green, lead arsenates, and fungicides, Congress passed a law, which was approved April 26, 1910, known as the insecticide act of 1910. The duty of collecting and examining official samples of articles coming within the meaning of the law and of certifying violations thereunder to the Department of Justice for prosecution was reposed in the Department of Agriculture, and for the performance of this duty a board of four scientists selected from as many bureaus of the department was created to assist the Secretary of Agriculture.

Official samples of insecticides and fungicides which have entered into interstate commerce or have been manufactured or sold within a State are collected by authorized sample collectors of the Department of Agriculture and are transmitted under seal, accompanied by the necessary evidence of interstate movement, to the Insecticide and Fungicide Board. Each sample is carefully analyzed and tested to determine whether it is adulterated or misbranded within the meaning of the law.

The results of examination are then considered by the board, and if the article is found to be in violation of the law recommendation is made to the Secretary of Agriculture through the Solicitor of the department that the responsible parties be cited to a hearing in order that they may have an opportunity to show any failure or error in the findings of the analyst or examiner. Hearings are appointed at such places and are conducted by such officers of the department as may be most convenient for all parties concerned.

Reports of such hearings are forwarded to the board for careful review, and if it still appears that any of the provisions of the law have been violated the facts are certified and all collateral evidence transmitted to the Solicitor, who in turn submits the same to the Secretary of Agriculture for reference to the Attorney General and the proper United States attorney, with recommendation that the offending parties be prosecuted. After judgment of the court, notices of judgment are prepared and given the widest possible publicity.

Various investigations have been made concerning insect powder, Paris green, tobacco powders, Bordeaux mixtures, and other insecticides and fungicides, and half a dozen orders have been issued.

FEDERAL HORTICULTURAL BOARD.

Under the act of Congress approved August 20, 1912, a Federal Horticultural Board, consisting of five members drawn from various bureaus of the department, was authorized and the members of the board were soon appointed. The duties of the board are to prevent the importation of nursery stock into the United States except under such circumstances as insure its freedom from plant diseases and insect pests; to prevent the transportation in interstate commerce of imported nursery stock except under prescribed regulations to prevent the spread of plant diseases and insect pests; to prevent the importation of any plants, fruits, vegetables, roots, bulbs, seeds, and other plant products not included in the term "nursery stock" when such importation would introduce a plant disease or an insect pest.

The Secretary of Agriculture is authorized and directed to quarantine any State or any part thereof when he shall determine the fact that a dangerous new plant disease or insect infestation exists therein.

Among the notices of quarantine already issued by the Federal Horticultural Board is one forbidding the importation of certain varieties of the pine tree from specified European countries; one prohibiting the movement from Hawaii into any other part of the United States of various specified fruits, berries, and seeds; and one forbidding the importation of potatoes from certain portions of Europe, the West Indies, and North America; and one prohibiting the movement of Christmas trees, holly, laurel, and other decorative Christmas greens grown in New England from that part of the country to other States.

This quarantine law to prevent the introduction of plant diseases and insect pests was caused by the immense damage that has been done by those that already have been introduced. Among the prominent insect pests that have caused enormous losses to this country are the gipsy moth, the brown-tail moth, the leopard moth, and the elm-leaf beetle, and to these should be added the notorious San Jose scale, the black scale, the white fly of the orange, and the codling moth; and there are the alfalfa weevil, the cotton boll weevil, the cabbage butterfly, and many others.

Among the foreign plant diseases that have been introduced into the United States, prominent ones are the asparagus rust, the cabbage blackleg, European canker of the apple tree, the anthracnose of the grapevine, and to these should be added the crown wart of alfalfa, the rust of clover, the black smut of rice, the blister rust of white pine, and the dreaded blight of the chestnut tree; and there are the rust of the carnation, chrysanthemum, and hollyhock.

EX-OFFICIO FUNCTIONS OF THE SECRETARY OF AGRICULTURE.

As a part of the work of this department, it is pertinent to mention the ex-officio duties of the Secretary, most of them created within the last 16 years.

The Secretary of Agriculture is designated a member of the board of appeals from decisions of the Commissioner of Internal Revenue as to oleomargarine and substances in imitation of butter, and as to deleterious ingredients in filled cheese.

He is authorized and directed to make rules and regulations, to be approved by the Postmaster General, under which injurious insects may be mailed, transported, etc., interstate.

The Secretary of Agriculture, the Secretary of the Treasury, and the Secretary of Commerce and Labor are to make uniform rules and regulations for carrying out the provisions of the food and drugs act, and to make uniform rules and regulations for carrying out the provisions of the insecticide act of 1910.

A National Forest Reservation Commission was created, consisting of the Secretary of Agriculture, the Secretary of War, the Secretary of the Interior, two members of the Senate, and two members of the House of Representatives, to consider and pass upon lands recommended for purchase for the protection of navigable streams.

An appropriation was made in 1912 to be expended by the Secretary of Agriculture, in cooperation with the Postmaster General, in improving the condition of the roads used in rural delivery and for ascertaining benefits in the operation of the Rural Delivery Service to local inhabitants in transportation of products.

OFFICE OF THE SOLICITOR OF THE DEPARTMENT.

IMPORTANT AND FAR-REACHING LAWS.

During the 16 years covered by this report there have been a number of important and far-reaching measures enacted by Congress designed for the protection of the health, welfare, and prosperity of the people of the United States. These measures are the culmination of scientific work and investigation of the Department of Agriculture, which exposed conditions requiring legislation to remedy them. Some of the more important acts referred to are the act of February 2, 1903, for the suppression of contagious, infectious, and communicable diseases of live stock; the act of March 3, 1905, which is an enlargement of the above act; the act of May 25, 1900, commonly known as the Lacey Act; the act of June 29, 1906, commonly known as the 28-hour law; the food and drugs act of June 30, 1906; the meat-inspection law of June 30, 1906; the insecticide and fungicide act of April 26, 1910, and the plant quarantine act of August 20, 1912.

All these statutes commit to the Secretary of Agriculture not only the details of their administration, but also the duty of enforcing their penal provisions. Hence it is that the Department of Agriculture has been charged with the execution of some of the most important penal statutes of the United States.

That such should be the case is directly due to the fact that the penal statutes referred to have grown out of conditions which were exposed by the department in its work to enable it to carry out the purpose of its organization, namely, to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word. All these statutes directly bear upon agricultural industries of the people of the United States, and logically their administration has been committed to the Department of Agriculture.

SUPPRESSION OF CONTAGIOUS DISEASES OF LIVE STOCK.

The act of May 29, 1884, established a Bureau of Animal Industry in the department, largely for the purpose of advising with State and Territorial officials in regard to the suppression of contagious diseases of live stock. Practically no authority was granted by this act to the Commissioner of Agriculture to regulate interstate commerce in diseased live stock. Sections 6 and 7 of the act prohibited under penalty the shipment and transportation of live stock actually diseased, the penalty, however, to be imposed only in case the animals were known to be diseased at the time they were shipped or transported.

This act did not meet the exigencies of the live-stock industry in the United States, and the department, having found through its investigations that, despite the law, diseases of live stock continued to spread over large areas of the country, recommended to Congress additional legislation to empower the Secretary of Agriculture more effectually to suppress the spread of contagious and infectious diseases of live stock. The recommendations culminated in the passage of the act of February 2, 1903, which authorized the Secretary of Agriculture to establish rules and regulations for the exportation and transportation of live stock between States of the United States and foreign countries where he had reason to believe live-stock diseases existed. This act also empowered him to seize, quarantine, and dispose of any hay, straw, forage, or similar material, or any meats, hides, or other animal products coming from an infected foreign country to the United States, or from one State of the Union to another, whenever in his judgment such action was advisable in order to guard against the introduction or spread of live-stock contagion. Suitable penalties were enacted for violation of the statute or disregard of the regulations promulgated thereunder by the Secretary of Agriculture.

The statute accomplished in a measure the general results for which it was enacted, but did not entirely cover the necessities of the case, and, as the act was also held by the United States District Court for the District of Nebraska to be unconstitutional, so far as it empowered the Secretary to make rules and regulations violations of which should constitute a crime, early in the third session of the Fifty-eighth Congress the Secretary recommended the enactment of a more comprehensive law which would give him the power, after ascertainment of the fact, to quarantine any State or Territory or portion thereof where contagious, infectious, or communicable live-stock diseases should be found to exist, in order that these diseases might not be spread through the medium of live stock which themselves might not be diseased. This recommendation resulted in the passage of the act of March 3, 1905, which is the act under which an epidemic of foot-and-mouth disease in 1908–9 was restricted to the localities in which it occurred until its successful eradication.

As a result of the administration of these acts the department has been able, during the 16 years covered by this report, to extirpate some of the most virulent live-stock diseases in large sections of the United States, with a consequent lifting of the Federal and State quarantine over substantial areas. This act was sustained as constitutional by the District Court of the United States for the Western District of Kentucky in December, 1908.

Between July 1, 1906, and June 30, 1912, 454 cases under the foregoing acts have been reported to the Attorney General, and of this number 160 cases have resulted in convictions and the imposition of fines amounting to $16,375.

THE LACEY ACT.

The act of May 25, 1900, commonly known as the Lacey Act, was passed upon the recommendation of this department to meet two distinct evils: (1) The importation into the United States of animals and birds which were ascertained by the department to be destructive to crops and poultry, and (2) commerce between the States in game killed in violation of State laws. Under this act importation into the United States of the destructive fruit bats, mongooses, and other predatory species has been prevented, and impetus has been given to legislation in the several States for the protection both of game and nongame birds and mammals. In 1909 the department having found through its efforts to enforce this act that it could not be given the effective operation which was plainly intended by Congress until a provision was added prohibiting the shipment from one State to another of game shipped in violation of local law, as well as game killed in violation of local law, recommendation was made that, in the codification of the act for purposes of the Penal Code, an amendment be inserted to cover shipment of game in violation of State laws, as well as the shipment of game killed in violation of local laws. Evidence to establish the unlawful killing of game was difficult to procure, and the department found itself very much handicapped in the enforcement of this provision. The shipment of game in violation of local laws was as much within the spirit of the act as the shipment of game killed contrary to law.

Under the enlargement of the act, as it now appears in the Penal Code, the department has been able to report a substantial number of cases to the Attorney General, and success has crowned the efforts of the department to check illicit interstate commerce in game.

Since July 1, 1906, there have been reported to the Attorney General 74 cases for violation of the act, and convictions have been secured in 22 of these.

THE TWENTY-EIGHT HOUR LAW.

The act of June 29, 1906, commonly known as the twenty-eight hour law, is a reenactment, with substantial and important amendments, of the act of March 3, 1873. The original act was intended to prevent cruelty to animals while in transit in interstate commerce; but, in its endeavor to enforce the act, the department was confronted with several decisions of the courts which narrowed its operation to such an extent that the benefits which were expected to accrue from its execution were in a considerable measure lost.

It had been held that the law did not apply to the receivers of railroads, and that it did not cover animals moving from a State into a Territory, or from a Territory into a State; both serious omissions at that time. Under the old law animals in transit were unloaded under circumstances of brutality and into pens in which the mud was 2 feet or more deep. The facilities for feeding, watering, and resting in the pens into which they were unloaded were entirely inadequate. There was no provision in this law for the owner of the stock, if he so elected, to furnish their food, and the carriers, under the provision giving them a lien upon the stock for their food, accumulated exorbitant charges against the stockmen. The requirement was peremptory that the stock be unloaded at the expiration of 28 hours. This in many cases operated not only disadvantageously to the stock themselves, but also to the owners and shippers, since by continuing the trip a few more hours the stock could have been delivered at their destination under circumstances both humane to the animals and profitable to their owners. The amendments which were recommended by the department were embodied by Congress in the act of June 29, 1906, and the law has been rigidly enforced during the entire time since its passage.

Since July 1, 1906, there have been reported to the Attorney General 3,795 cases, of which 1,784 have resulted in judgments for the United States and the payment into the Treasury of $212,745.

FOOD AND DRUGS ACT.

The food and drugs act of June 30, 1906, was the result of repeated efforts of the department to secure the enactment by Congress of a law to suppress widespread adulteration and misbranding of foods and drugs passing in commerce between the several States and Territories and imported into the United States from foreign countries. Prior to the enactment of this law the department, after most exhaustive investigation, had determined the standards of purity which general opinion had established for the more important food products. Departures from these standards were the rule rather than the exception, and deceit in the manufacture and sale of foods and drugs had grown to such an extent that many manufacturers regarded any interference with their business as an invasion of vested rights.

Immediately upon the passage of the act the department organized the requisite force for its vigorous administration and has prosecuted its work under the act without abatement ever since. The constitutionality of the act has been sustained by a number of the Federal courts, and numerous decisions of the Federal courts have construed its provisions. During the operation of the law 3,456 cases have been reported to the Attorney General involving prosecutions against individuals and private corporations, resulting in 1,226 convictions and the imposition of fines amounting to $47,982; 1,296 seizures of foods and drugs have been made, resulting in 867 decrees of forfeiture and condemnation. The department has published 1,626 notices of judgment as required by the act.

MEAT-INSPECTION LAW.

The meat-inspection law of June 30, 1906, was the culmination of efforts of the department for years prior to secure the enactment of a law which would authorize rigid inspection of meat and meat-food products intended for interstate and foreign commerce. A makeshift statute was passed and approved August 30, 1890, but the statute did not provide for post-mortem inspection at the time of slaughter; furthermore, it was confined to salted pork and bacon intended for exportation to foreign countries the Governments of which should require inspection thereof. The measure failed of its purpose, however, for in the next annual report of the Secretary of Agriculture he urged the enactment of a law which would provide for national inspection of cattle at the time of slaughter. In compliance with the Secretary's recommendation, the act of March 3, 1891, was passed.

This act made it mandatory upon the Secretary to cause an antemortem inspection to be made of all cattle, sheep, and hogs which were the subject of interstate commerce and which were to be slaughtered, and at slaughterhouses, etc., and provided that there might also be made, when deemed by the Secretary of Agriculture advisable, a post-mortem examination. The restrictions which had theretofore been placed by foreign countries on the importation of meat-food products from the United States were in a measure removed.

Notwithstanding the benefits which accrued from the enforcement of this act to American producers of meats, the statute still failed to meet the continued and growing abuses in the production and packing of meats and meat-food products. In the spring of 1906 rumors gained credence that the packing houses of the country were not conducted in a sanitary manner and that the inspection under the acts of 1891 and 1895 was not conducted efficiently. The Secretary of Agriculture appointed a committee to investigate conditions at one of the large packing centers, and the President of the United States appointed a committee for the same purpose. When the report of the latter committee was received by the President, he transmitted it to Congress on June 4, 1906, accompanied by a message in which he stated that a law was needed to enable the inspectors of the General Government to inspect and supervise from the hoof to the can the preparation of meat-food products. The President recommended to Congress the passage of an act to provide for a Federal inspection of meats and meat-food products at all stages of preparation. The report of the committee appointed by the Secretary of Agriculture was also transmitted to Congress by the President. This report embodied the recommendation that interstate commerce in meat and meat-food products of cattle, sheep, swine, and goats be prohibited, unless they should be marked in accordance with the regulations of the Secretary of Agriculture to show that they had been inspected.

In compliance with these recommendations, Congress enacted the meat-inspection law of June 30, 1906, and under it the department has not only been enabled in a large measure to prevent interstate commerce in diseased and unsound meats and meat-food products, but it has also been able to enforce sanitary measures in the packinghouses.

There have been reported to the Attorney General 311 cases of violations of the meat-inspection law, of which 168 have resulted in convictions and the imposition of fines amounting to $11,117, as well as a number of jail sentences.

INSECTICIDE AND FUNGICIDE ACT.

The insecticide and fungicide act of April 26, 1910, was passed by Congress in furtherance of the recommendation of the Secretary of Agriculture as a result of investigations which had been made by the department into the character and quality of material on the market and widely sold under representations of efficacy in the destruction of harmful and injurious insects and fungus diseases. The annual report of the Secretary of Agriculture for 1905 stated that the investigations of the department had shown that many of the insecticides offered to the farmers of this country are of little value and that the price demanded and the value of the goods are not always proportionate. Samples of insecticides widely in use were examined in the Bureau of Chemistry and found not only to want the efficacy ascribed to them, but also to be themselves more destructive than the insects or diseases they were intended to destroy. The act follows in substantial form the provisions of the food and drugs act of June 30, 1906, and is intended to suppress interstate commerce in adulterated and misbranded insecticides and fungicides.

There have been reported to the Attorney General for prosecution and for seizure of adulterated and misbranded goods 58 cases, and convictions have resulted in 7 cases.

PLANT QUARANTINE ACT.

The plant quarantine act of August 20, 1912, is the successful outcome of a number of attempts since 1899 to secure the enactment by Congress of a comprehensive law which would enable the Federal Government to prevent the importation into the United States from foreign countries of nursery stock infested with injurious insects or affected with plant diseases, and also to prevent the spread of insect pests and plant diseases from one State to another. The act in its general scheme follows the cattle quarantine law of 1905, and under its provisions the Department of Agriculture, by regulations promulgated by it, now has the power to control plant diseases and parasites coming into the United States, as well as those which originate in or are indigenous thereto.

TRESPASSES ON NATIONAL FORESTS.

The creation of National Forests out of lands in the public domain suitable for the purpose was authorized by the act of March 3, 1891, and the jurisdiction over them was conferred upon the Secretary of the Interior by the act of June 4, 1897. This jurisdiction continued until February 1, 1905, when it was transferred to the Secretary of Agriculture. Since the transfer of this jurisdiction the National Forests have multiplied in number and increased in territory until, at the present time, there are nearly two hundred million acres of public lands reserved as National Forests.

From February, 1905, until December, 1908, the department endeavored to administer the forests from Washington, but the increase in extent of the forests and the increasing use of the lands for purposes authorized by law plainly indicated that the only successful method of administering them lay in the organization and maintenance of districts with headquarters at a convenient point in each district. So, on December 1, 1908, 6 districts were organized in the West, where, of course, all the National Forests were situated. This system has resulted in their successful and businesslike administration.

Prior to the creation of the National Forests stockmen were accustomed to use the lands embraced in them without regulation in any respect by the Government, and the Government not only received no return for the valuable resources furnished, but there was also constant friction, sometimes even approaching border warfare, between owners of different kinds of stock, or even between owners of the same kinds, growing out of the natural tendency of individuals to monopolize the more valuable areas for their own profit. The department, under its authority to regulate the use of the lands in the National Forests, has by carefully planned regulations provided for the use of grazing lands, and all stockmen are afforded an opportunity to enjoy the privileges which the forests can provide and the Government receives a compensation for the use of its grazing lands. Some hostility to the permit system of administering the grazing lands was encountered for a time, but it can confidently be said that the stockmen of the West now regard the administration of grazing lands on the National Forests as conducive to the peace and welfare of everyone who desires to graze stock thereon. Since the Department of Agriculture assumed control of the National Forests the returns from grazing permits have averaged $1,000,000 a year, and at the same time users of the forests have had the benefit of a rate of charge much below the rate prevailing on private lands in the same vicinity. The validity of the grazing regulations has been sustained by the United States Supreme Court.

At the time of the transfer of jurisdiction over the National Forests to the Secretary of Agriculture a number of very extensive timber trespasses had been committed, both on lands prior and subsequent to their inclusion in forest reserves. The department made careful investigation into all these trespasses, and during the last two or three years brought them to the attention of the Attorney General. Suits were instituted, and the Government has recovered upwards of half a million dollars for these depredations, some of which were begun 20 years ago. Sales of timber from the forests have averaged three-quarters of a million dollars a year since this department assumed control of them, and, at the same time, the condition of standing timber has been greatly improved by silvicultural investigation and experiments, and large areas where trees never grew have been seeded and forested.

ILLEGAL CLAIMS TO LANDS IN THE NATIONAL FORESTS.

The department has worked out a system of water-power control which is under most successful operation at the present time. It is, of course, natural in the administration of nearly 200 million acres of land under regulations which permit the use of the lands for private purposes that numerous and important legal questions will arise, to say nothing of the preparation of necessary contracts and other instruments to perform properly the business of the department in connection with these lands. These exigencies made it imperative that legal assistants should be detailed to the 6 Forest Service districts for the performance of the legal work of these districts. Since the spring of 1910 these legal assistants have been in the office and under the supervision of the Solicitor of the department. Two have been assigned to each of the districts, except that in districts 4 and 5, where it has been found possible to perform the work with one assistant, only one has been assigned to each. The work of these district assistants to the Solicitor is varied and extensive, including preparation of all contracts and other written documents, legal advice to the district foresters, assistance to the United States attorneys handling the department's cases, and cooperation with the agents of the Interior Department in the prevention of both illegal and unwarranted acquisition by individuals of lands in the National Forests under the various public land laws. Many of these claims were and are known or believed to be either fraudulent or without warrant of law. It was and is, therefore, the duty of the Secretary of Agriculture, as custodian of these lands, to see that these claims were and are not allowed to be perfected and title procured by patent. The department's efforts to defeat fraudulent and unauthorized claims to lands in the National Forests had been successful in a large measure, but it was realized that closer cooperation between the Department of the Interior and the Department of Agriculture was requisite to that degree of success which would insure the best results for the Government.

With such cooperation in view, the two departments, in June, 1910, entered into an agreement by which the Department of Agriculture was to be recognized in the Interior Department as an active contestant in all claims cases against which an adverse report was made by forest officers. This agreement embodied also the provision that the law officers of the Department of Agriculture should have the right to attend and participate in all hearings ordered by the Department of the Interior for the taking of testimony; and the right of appeal from decisions of the Commissioner of the General Land Office adverse to the Government in Forest Service cases was likewise accorded the law officers of the Department of Agriculture.

Since this agreement went into force the efforts of the department to defeat fraudulent and unwarranted claims to lands have been crowned with conspicuous success.

LEGAL BUSINESS FOR THE FOREST SERVICE.

A record of the legal business for the Forest Service has been preserved since February, 1910, and some estimate of the extent and scope of this work may be gathered from the following brief summary of cases handled during that time:

The Solicitor of the department has rendered 2,627 written opinions to the Forest Service on legal questions arising in the administration of the National Forests; upward of 3,000 cases involving claims to lands under public-land laws have been handled, of which fully two-thirds have been decided in favor of the Government; 73 cases of illegal occupancy of lands in the National Forests have been reported to the Attorney General; 193 grazing trespass cases have been similarly reported, resulting in the recovery of damages to the amount of $5,890 actual and $1,525 punitive and fines to the extent of $1,173; 98 fire trespass cases have been reported, resulting in the imposition of fines amounting to $1,178 and the collection of damages to the amount of $61,427, and in addition 62 prosecutions have been maintained under State laws, resulting in 52 convictions; 122 timber trespass cases have been reported to the Attorney General, resulting in the recovery of damages to the extent of $316,862 and the imposition of fines amounting to upward of $500, together with several jail sentences. Besides cases reported to the Attorney General, administrative settlements for trespasses on the forests have been made in 224 cases, resulting in the payment to the Government of $31,643.

WEEKS FORESTRY LAW.

The maintenance and administration of the National Forests in the West having demonstrated the importance of protection of forest lands as a means of conserving and promoting water flow, the department for a number of years past urged upon Congress the advisability of the acquisition of timbered lands in the East as a means of conserving and promoting the navigability of navigable streams in the Eastern States where the Government has never owned lands. Especial attention was called to the rapid disappearance under wasteful methods of large areas of timber on the watersheds of important navigable streams in and contiguous to the Appalachian Mountain Range. The recommendations of the department culminated in the act of March 1, 1911, commonly known as the Weeks Forestry Law, under which the Secretary of Agriculture is authorized to examine, locate, and recommend for purchase such lands as, in his judgment, may be necessary for the regulation of the flow of navigable streams, and to report the results of such examinations to a commission created by the act and designated the National Forest Reservation Commission.

Upon the approval of the purchase by the commission the Secretary is authorized to purchase the lands for the United States and thereafter to organize them into National Forests, to be administered, with certain limitations, as other National Forests are administered. An appropriation of $13,000,000 was made for purposes of the act, and active operations were commenced immediately upon its approval.

There are at present 45 contracts with owners of lands to convey to the Government lands aggregating 268,627 acres, situated in New Hampshire, Virginia, Tennessee, North Carolina, and Georgia. Negotiations are being conducted for the purchase of additional areas in these States and others where the control of forests is essential to a conservation of the water flow in navigable rivers. One tract of 8,213 acres in North Carolina has already been acquired by the Government, and another tract of 32,000 acres in Georgia will be acquired as soon as adjustment can be had in the condemnation proceedings pending. The department's record examiners attached to the Office of the Solicitor have already examined the titles to a large portion of the lands embraced within the contracts for conveyance to the United States, and in several cases their reports have been submitted to the Attorney General.

CONCLUSION.

The record of 16 years has been written. It begins with a yearly farm production worth $4,000,000,000 and ends with $9,532,000,000. Then, farmers were loaded with debts that were a painful burden; prosperity followed and grew with unexampled speed. Then, the farmer was a joke of the caricaturist; now he is like the stone that was rejected by the builder and has become the head stone of the corner. Beginnings have been made in a production per acre increasing faster than the natural increase of population. There has been an uplift of agriculture and of country life.

In this movement the department has been gradually equipped to occupy a foremost place. It came to learn and it remained to teach. Its influence penetrates the remotest neighborhood. It performs a mission of welfare and happiness to farmers and to the whole Nation. The millions of dollars that it costs are returned in tens of millions of wealth saved and wealth produced.

The department is prepared to continue and increase its public service. During 16 years it has progressed from the kindergarten through the primary, middle, and upper grades of development until now it has a thousand tongues that speak with authority. Its teachings, its discoveries, and its improvements are permeating the national agricultural life. The forces that are at work must cause ever-increasing results.

The great and growing movement carried on by the department for agricultural betterment has not been sustained solely by one man, nor by a few men. A choice corps of scholarly experts in their special lines of endeavor has been growing in membership, in breadth of view, and in the practical application of their efforts. They have been and are men both good and true, men with high ideals, often sacrificing greater remuneration in private employment for love of the great results of their public service. No great work can be begun, nor sustained, by this department without such men.

Men grow old in service and in years, and cease their labor, but the results of their labor and the children of their brains will live on; and may whatever of worth that is in these be everblooming.

The details of the operations of the department will be found in the reports of the heads of the several bureaus, divisions, and offices.

Respectfully submitted.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *November 27, 1912.*

REPORTS OF CHIEFS.

REPORT OF THE CHIEF OF THE WEATHER BUREAU.

United States Department of Agriculture,
Central Office of the Weather Bureau,
Washington, D. C., August 31, 1912.

Sir: I have the honor to submit a report of the operations of the Weather Bureau during the fiscal year ended June 30, 1912.

Willis L. Moore,
Chief of Weather Bureau.

Hon. James Wilson,
Secretary of Agriculture.

MOUNT WEATHER RESEARCH OBSERVATORY.

INVESTIGATION AND RESEARCH.

Investigation of the upper atmosphere.—Aerial investigations carried on at the Mount Weather Research Observatory have now resulted in the completion of a series of practically continuous atmospheric soundings extending over the last five years. The data thus afforded are in course of summarization and will be in suitable form for further study at an early date.

At the beginning of the kite work in the Weather Bureau, about 14 years ago, it was our expectation to be able to obtain data from which to construct a synoptic chart of the meteorological conditions prevailing in the free air some distance above the earth for a given date. This plan failed, through the impossibility of getting the kites into the air at all stations on the same dates.

In connection with the kite and captive balloon work at Mount Weather we have had in mind to explore as fully as might be done the layers of air next to the earth's surface, the data so procured to serve primarily to increase our knowledge of the processes that are continually going on in the free air, and, secondarily, as a probable aid in weather forecasting.

It seemed improbable at that time that the results of free-air observations from a single station could have a very wide application in making general forecasts. However, the experiment had never been tried, and the establishment of the Mount Weather Observatory made it feasible and desirable that the effort be made. The station was accordingly equipped with the best of modern appliances for kite flying, and a force of men was assembled which soon became quite skilled in the details of the work. This combination of personal skill and thorough equipment resulted in obtaining at Mount Weather the highest kite flights ever made, and, what is more important, nearly continuous daily flights. Some of the flights were made under trying conditions. During the prevalence of fog, rain, snow, or high winds practically all of the flights were low, the meteorograph at such times being carried barely beyond the influence of the mountain top. Under adverse as well as favorable conditions the work was carried on, and it has been shown beyond doubt that at times the meteorological conditions disclosed by kite flights shed light upon the problem of weather forecasting. The work has thus been justified on the ground of its usefulness in forecasting, as well as on the broader ground of affording a substantial addition to the sum of our knowledge respecting the conditions that exist in the air some distance above the earth's surface.

Three series of continuous kite flights were made by day and by night during the year, with a view of obtaining further information regarding the diurnal variation of temperature in the free air with increase in altitude. More observations of this character are needed in order to fix with some definiteness the altitude in the free air to which the diurnal warming and cooling, respectively, extend.

In addition to the current work of daily kite flights, a report on the sounding-balloon ascensions made in western States in 1909, 1910, and 1911 has been completed and given publication as part 4, Volume IV, of the Mount Weather Bulletin for 1911. These ascensions were made, it may be remembered, for the purpose of exploring the air strata mostly between 3 and 15 miles above the earth's surface. Up to 3 miles above the surface of the earth independent explorations of the atmosphere have been extensively carried on by means of kites and captive balloons at Mount Weather, Va., and Blue Hill, Mass., in this country, and at many places in the British Isles and on the Continent of Europe. The conditions existing above the 3-mile level form an international problem in the solution of which the meteorological services of practically all civilized countries are engaged. The report already mentioned includes a discussion of the records of 138 sounding-balloon ascensions, 79 of which were made by the Mount Weather Observatory and the remaining 59 by the Blue Hill Observatory, thus uniting in one publication all of the high-level meteorological observations made in the United States. On the whole, this report forms the most important contribution to the meteorology of the higher atmosphere thus far made at Mount Weather. The atmospheric conditions at extremely high levels, as disclosed by these records, are not wholly in accord with the conditions found to exist at similar levels above the Continent of Europe, where the upper levels of the atmosphere have been more thoroughly explored. It is evident that in the United States only a good beginning has thus far been made in the exploration of the upper levels of the atmosphere, and that the phenomena observed and discussed in the report need further confirmation before we can consider them as being founded on sufficient observational data.

TEMPERATURES ON MOUNTAIN TOPS AND IN ADJACENT VALLEYS.—Studies of temperature conditions on mountain tops and in the adjacent valleys at Mount Weather and elsewhere have been continued and the results have appeared in the Mount Weather Bulletin. In general, these studies have tended to fix the relation between the prevailing weather conditions and the amount and quality of change of temperature to be expected in the valleys below. Indirectly, the data secured by these studies have an important bearing on the question of air drainage, and consequently on the protection of fruit in the valleys below.

SOLAR RADIATION INVESTIGATIONS.—The gradual extension of this work is continually demanding new and improved instruments, consequently considerable time is devoted to developing and testing apparatus. The Mount Weather Observatory now has the following equipment for the measurement of the intensity of solar radiation and the polarization of sky light:

One Callendar pyrheliometer, exposed horizontally above the roof of the physical laboratory.

Two Callendar pyrheliometers, one with the glass cover removed, and both mounted equatorially and clock driven, and shielded from diffuse sky radiation by means of diaphragmed tubes.

One Leeds & Northrup recording Wheatstone bridge.

Three Marvin pyrheliometers having different types of thermal elements, with auxiliary apparatus.

One Smithsonian silver disk pyrheliometer.

One Ångström pyrheliometer, reserved for comparative readings.

One Ångström pyrheliometer with absorption screen.

Two Pickering polarimeters.

Two Savart polariscopes.

Measurements of the polarization of sky light, of the positions of the neutral points of Arago and Babinet with the sun near the horizon, and of the intensity of solar radiation, have been made at Mount Weather throughout the year whenever atmospheric conditions permitted, except when the observer was absent from station on other duties. Polarization measurements were obtained on 63 days and radiation measurements on 73 days. These measurements are employed in studies of atmospheric transmissibility, which not only varies with the weather conditions from day to day, but also varies from year to year, on account of causes not yet well understood.

Since May 16, 1912, a continuous record has been maintained by means of the horizontally exposed Callendar pyrheliometer and one of the recording bridges, of the intensity of the radiation received from the sun and sky upon a horizontal surface. By means of the other recording bridge and one of the equatorially mounted Callendar pyrheliometers occasional records have been obtained of the intensity of direct solar radiation. At the same time the intensity of direct solar radiation has been measured either by a Marvin pyrheliometer or the Smithsonian silver disk pyrheliometer, or both. Comparisons of the records of the two automatic instruments give measurements of the intensity of the radiation received diffusely from the sky upon a horizontal surface. Comparisons of the records from the equatorially mounted Callendar pyrheliometer and the measurements by the Smithsonian silver disk pyrheliometer indicate a difference between the Smithsonian and the Callendar standards. However, the comparisons, at least, make it possible to express all the measurements in units of the same value.

Continuous records were obtained by means of a horizontally exposed Callendar pyrheliometer throughout the year at Madison, Wis., and until April 22, 1912, at Washington. The intensity of direct solar radiation was occasionally measured at Washington by means of an Angström pyrheliometer, and at Madison, Wis., throughout the year whenever atmospheric conditions would permit, and after November 10, 1911, at Lincoln, Nebr., by means of a Marvin pyrheliometer. Preparations had been practically completed for the installation of a Marvin pyrheliometer on the Government reservation at Santa Fe, N. Mex., in April, 1912. The removal of the Weather Bureau office at Santa Fe from the Federal building necessitated delay and a change in plans, but the pyrheliometer will probably be installed at the present office in Santa Fe before the close of 1912.

The measurements of the intensity of direct solar radiation made at Madison, Wis., during the two years ending with June, 1912, have been prepared for publication in the Bulletin of the Mount Weather Observatory. The most interesting feature of these results is the high intensity measured each year during the months of February, March, and April. Some measurements of the intensity of radiation reflected from cloud surfaces, obtained at Madison and Mount Weather, have been prepared for publication in the Bulletin, and also some measurements of sky polarization and the intensity of both direct and diffuse radiation, made at Mount Weather during the dense haze that prevailed on June 10 and 11, 1912. Radiation measurements not only give definite information with regard to an important climatological element, but after we once learn to interpret them they must also serve as valuable integrating measurements of atmospheric conditions at all levels.

The effect of smoke upon the climate of cities constitutes a problem in atmospheric transparency that received attention by the Weather Bureau during the year. The results will be published by the University of Pittsburgh, in connection with the results of other studies of the smoke problem.

PLANS FOR THE COMING YEAR AT MOUNT WEATHER.—So far as the aerial work at Mount Weather is concerned, it is proposed to modify the plan heretofore followed to the extent of not attempting to obtain a kite or balloon flight on each day regardless of the weather conditions, unless there is a type of weather over the station which it is desired to explore. The time so saved will be utilized in work on other problems of the atmosphere which relate less directly to the forecast work of the service. A beginning has been made on one of these problems, namely, the nucleation of the atmosphere at the low temperatures and pressures which prevail at the higher levels. It is hoped to continue kite flights throughout the 24 hours on selected dates, with a view of studying the diurnal temperature wave in the atmosphere, a beginning in which has already been made.

It is our purpose to utilize the equipment at Mount Weather in the study of such other problems in the practical work of the service as may be susceptible of laboratory treatment, and also to undertake photometric measurements of the intensity of sky light under different atmospheric conditions. Aside from the economic value of such measurements, they will be of meteorological interest because of their close relation to radiation intensity and atmospheric transparency.

MOUNT WEATHER BULLETIN.—The Bulletin of the Mount Weather Observatory has continued to publish the results of the important work done at that station. Its last volume, with index, completed on June 15, 1912, includes four regular quarterly parts and two extra parts, of which No. 4, the "balloon number," gives a complete summary of all work done during 1904–1911 in the United States with sounding balloons. This volume also includes a summary by Dr. Blair of all the daily kite flights during the three years July 1, 1907, to June 30, 1910. In addition to these extensive summaries of results by flights from kites and balloons the Bulletin has included several special memoirs by Profs. Henry, Humphreys, and Kimball. Prof. A. C. Crehore and Capt. G. O. Squier, of the Army Signal Office, have contributed a paper on the recording of minute changes of pressure by a special form of barograph. The bureau is indebted to the kindness of Mr. J. W. Sandstrom for the memoir published in the Bulletin, Volume III, part 6, "The relation between atmospheric pressure and wind," which has attracted wide attention. A second memoir, dealing specifically with the wind phenomena of mountains and seacoast, has been prepared by the same authority and will appear in full in the next volume of the Bulletin. The remarkable success attending Prof. Stoermer's study of the aurora borealis was fully explained in the third volume of the Bulletin. His complete report as now published shows that this subject must be taken up by his methods and by American observers if we would contribute to our knowledge of atmospheric electricity over the Western Hemisphere. Of the original contributions to the science and literature of meteorology made during the year by Prof. W. J. Humphreys, of the scientific staff of the Weather Bureau, several discuss the physical interpretation of certain luminous and other phenomena of the upper atmosphere. One paper, "Holes in the air," is of special interest to aviators, since it discusses in some detail a number of distinct atmospheric conditions that render flying dangerous, and also shows when and where they are most likely to occur and how best to avoid them. Another paper discusses at length one of the most difficult problems of meteorology—the phenomenon of the 12-hour periodic variation of the barometer. It is believed that the contributing causes of this phenomenon, of which there seem to be at least three, have been found and that this "meteorological mystery," as it has been termed, is at last substantially solved.

SCHOOL OF INSTRUCTION.

The duties of assistant observer at the 200 stations of the weather service outside of Washington are largely technical in character, and require on the part of the employee a knowledge of instruments and of methods of tabulating the results therefrom that can be obtained only by actual experience. It may be safely said that a new employee does not become really useful until he has had at least three months' experience under the guidance of a trained observer. If he is given immediate station assignment, the quality of the instruction that he will receive will depend largely on the kind of work performed at his station. Certain classes of work, such as the making of weather maps and the taking of observations, are common to all parts of the country, but as a rule the general character of work is largely determined by the size and geographic position of the city in which the station is located. Thus, under local training alone, the instruction given a new employee is neither uniform nor complete unless he has made the round of all sorts of stations. It has therefore been decided to give new employees a systematic course of instruction in all branches of the work performed at any station, wherever it may be located. This is to be done at Mount Weather. Two rooms in the physical laboratory building have been set apart for the purpose, and all the paraphernalia of a fully equipped Weather Bureau station have been procured and properly installed. The aim will be to give the employee under instruction the actual practical experience necessary to fit him for the duties required of him later in his term of service. The observation station will be conducted in precisely the same manner and under the same general instructions as a regular station of the bureau. Meteorological observations will be made and prepared for transmission by telegraph. Copies of telegraphic reports received from the central office in Washington by mail will be translated and the results spread upon weather maps, and the new employees will be instructed in the several methods of map making and the preparation of the plates from which weather maps are printed. A course in the construction and upkeep of meteorological instruments will also be afforded, so that each new employee may be able not only to interpret the indications of meteorological instruments, but also to discover and remedy faults that may arise in them.

FORECASTS AND WARNINGS.

The forecasting of the weather and temperature conditions for the various States for 36 to 48 hours in advance, the dissemination of special warnings of heavy snows, cold waves, frosts, and other unusual atmospheric conditions for the continent, the display of warnings of the coming of destructive storms over the Great Lakes, along the Pacific, Atlantic, and Gulf coasts, and over West Indian waters for the benefit of shipping, the issue of daily forecasts of wind and weather conditions likely to be encountered by trans-Atlantic steamers in passing from the north Atlantic ports to the region of the Grand Banks, have been successfully carried on by the bureau as in former years.

In the forecast room at the central office is prepared each morning a synoptic chart of pressure and weather conditions over the Northern Hemisphere. This chart is based on reports received from foreign meteorological services and from Weather Bureau stations in the United States, Alaska, Hawaii, and the West Indies. The world-wide survey of atmospheric conditions presented by these charts is not only indispensable to the forecaster in his daily forecast work, but has also made possible accurate predictions of the general weather and temperature conditions over the United States for a week in advance. All pronounced changes from the prevailing types of weather conditions, whether from dry to wet, or wet to dry, and all reversals in temperature conditions have been successfully announced to the public through these weekly forecasts, which are given widespread publicity by means of the various press associations.

During the year the field of observations over the Northern Hemisphere was materially extended. Reports are now being received from Dutch Harbor, in the Aleutian group of islands, by wireless, and daily reports from Nemuro in Japan and Shanghai in China come over the Manila cable. Additional daily observations by cable are also being received through the Russian meteorological service from Vardo, Astrakan, Tashkend, Nertchinsk, and Yakutsk.

PROPOSED WEATHER SERVICE FOR THE NORTH ATLANTIC OCEAN.

The Chief of the Weather Bureau visited England and took part, from June 4 to July 6, 1912, in the International Radiotelegraphic Conference. As a result of his intercessions, which were indorsed by all of the delegates of the United States, the conference agreed to an international regulation which shall give weather observations the right of way over all messages except distress calls. This is an important regulation and will make it possible in time to organize complete ocean weather services. With the cooperation of the various maritime nations, it is proposed to inaugurate in the near future a weather service for the north Atlantic Ocean. The ocean will be divided into two zones by the thirty-fifth meridian of longitude west of Greenwich. Observations taken over the western zone will be forwarded to Washington either directly or by relaying from one vessel to another, and observations taken within the eastern zone will be forwarded in like manner to Europe. Charts based on these reports will then be constructed and the dangerous storms located. While many of the observations will be repeated from ship to ship and thence to land stations on account of the comparatively limited radius of the transmitting stations on vessels, it is expected that information regarding the location and movement of dangerous storms will be transmitted to all vessels within the western zone at the same instant from some one of the high-power stations on our Atlantic seaboard. The value of such a service to life and property on the ocean can be faintly realized when it is considered that warnings to the shipping of the entire Atlantic, especially to tramp and other vessels that can not so well stand severe weather, will enable them by a slight change in their course to avoid the dangerous quadrants of the more severe storms.

An interesting and valuable extension already inaugurated in the weather service is the receipt daily, morning and evening, by aerial telegraphy of reports from vessels at sea off the middle and south Atlantic coast and in the Gulf of Mexico and Caribbean waters. With the further perfection of the wireless telegraph service, these reports will become of increased importance.

Among the more striking weather features that were successfully forecast during the year are the following: The cool weather following the prolonged hot wave in July, 1911; the hurricane of August along the Georgia-North Carolina coasts; the freezes in the west Gulf States in November; the severe freeze in California during December; the record-breaking cold wave of January; and the heavy snowfalls in the Middle West during the winter of 1911-12.

BREAKING UP OF THE HOT WAVE OF JULY, 1911.

During the early part of July and for some time previous the weather had been unusually warm over the eastern half of the country. The breaking up of this heated period was indicated in the following bulletin, issued July 12:

> For a prolonged period the barometric pressure has been above normal over the Atlantic Ocean and low over the northwestern portion of the American continent. The international weather map of Wednesday showed a reversal of this pressure distribution—an extensive area of high barometric pressure appearing over Alaska, while the pressure over the middle latitudes of the Atlantic Ocean has fallen to below normal. This changed pressure distribution is strongly indicative of the dissipation of the warm weather over the Eastern States and the Middle West in the immediate future and the beginning of a period of moderate temperature in those districts lasting through the remainder of this and continuing into next week.

The cool weather announced in the bulletin overspread all parts of the country east of the Rocky Mountains on July 13 and 14, and on the night of the 16th light frosts formed in the cranberry marshes of Wisconsin. The following editorial comments on this forecast are extracted from the daily press:

Hannibal (Mo.) Courier-Post:

> That the theory of meteorologists as to the immediate cause of the long-continued heat in this country is correct is demonstrated by results. They claimed that an extensive area of high barometric pressure had prevailed over the Atlantic since June 13 and that its effect was to interfere with the usual eastward movement of waves of temperature, damming up the heat, as it were. About July 8 this wall disappeared and the effects were soon manifested. The heat wave moved eastward and cool currents followed.

St. Louis (Mo.) Globe-Democrat:

> It has been six days since the head of the Government Weather Bureau predicted the end of the long heat wave. His prediction has been so signally vindicated this time that it is worthy of special note, for great are the responsibilities and numerous the unavoidable embarrassments of the Weather Bureau, chiefly because human knowledge of the elements is still elementary compared to what we may expect it to be at the end of the next 100 years. On July 12 Chief Willis L. Moore said (quoting the forecast before given): "This," said the weather chief, "would bring a long-continued cool spell." The spell is here, and has been since Saturday last.

AUGUST, 1911, HURRICANE ALONG THE GEORGIA-NORTH CAROLINA COASTS.

A storm of small diameter and hurricane intensity passed inland from the south Atlantic Ocean slightly north of Savannah, Ga., about 8 a. m. August 28. On the morning of the 27th advices were sent to Savannah and Charleston as follows:

> Advise caution locally until further advices. Indications of a disturbance approaching coast.

Storm warnings were ordered for the two stations mentioned at 10.55 a. m. of the 27th, and the following message was sent them at 3.30 p. m. of that date:

> Hoist hurricane warnings 3.45 p. m. Storm still apparently off South Carolina and Georgia coasts; intensity unknown. May develop hurricane force. Advise all interests to take necessary precautions.

Shipping interests along the entire coast were fully advised. The storm was not so destructive at Savannah as at Charleston, although it passed nearly over the former city. The following editorial regarding the warnings appeared in the Savannah (Ga.) News of August 30:

> A word of appreciation and thanks is due to the Weather Bureau for its warnings of the coming of the storm. There was more than 12 hours' notice—all that might be expected. The warning bulletins were in positive language. There was no guesswork. It sometimes occurs that the Weather Bureau makes a mistake, but it always errs on the safe side. It gives property interests the benefit of the doubt.

NOVEMBER, 1911, FREEZES IN THE WEST GULF STATES.

The warnings issued in advance of the two severe freezes in the west Gulf States in November, 1911, enabled sugar, orange, and truck growers who were prepared to act on advices from the Weather Bureau to protect crops to the value of several millions of dollars, which would have otherwise been lost. Sugar planters protected their cane by windrowing. By smudging their orchards, orange growers not only protected the trees from damage, but saved the ripe fruit on the trees. Truck growers covered, smudged, or flooded their crops. The following editorial regarding the warnings and the benefits derived therefrom appeared in the New Orleans Times-Democrat of December 3, 1911:

> It is impossible as yet to determine definitely and accurately the damage and loss to the Louisiana cane crop caused by the two recent freezes. It is unquestionably heavy, but how heavy we will not know until a careful examination has shown the condition of the cane. It is believed that it will be possible to determine this point in the next few days, and that we will then know within a few thousand dollars how much Louisiana has lost by the two unexpected and early freezes of last month.
>
> Louisiana, and New Orleans in particular, has counted with great confidence on its sugar crop. The acreage was larger than usual; the cane, although a little backward, was in good condition and promised an exceptionally large tonnage to the acre; and finally, sugar is commanding a better price than for years past. A profit on the crop of between $7.000,000 and $10.000.000 over last year was looked for; and the circulation of that money promised activity in every line of business.
>
> Suddenly and unexpectedly there descended on the sugar belt the freeze of November 13. It was one of the earliest freezes ever known in this section, and caught the planters unprepared, when they had only just begun their grinding. Fortunately the freeze continued only a few hours, so that the loss was not as heavy as it would otherwise have been. Two weeks afterwards, on November 27, came another freeze, more far-reaching, more severe, and far more damaging. It is the uncertainty as to the amount of the damage that renders it impossible to figure out the exact loss.
>
> If we look back to the old records, before the Government established the Signal Service or Weather Bureau, we will find that the damage from premature freezes of this kind brought overwhelming ruin to the cane crop, and that in many years the crop was injured three-fourths and more. The planters had nothing to guide them as to the weather, no notice of the coming of a freeze until it was on them. To-day, because we know more of the weather, the loss is not likely to be over 15 per cent.
>
> It is difficult to appreciate how much these weather forecasts mean to the cane growers, for perhaps no crop is in greater danger from sudden changes than sugar cane. Both of the recent freezes were sudden. The wind which carried the cold wave of November 13 to the sugar belt was blowing 40 to 50 miles an hour. It was impossible, therefore, to predict the freeze more than 40 hours in advance; but these 40 hours given the sugar planters to prepare were invaluable and saved Louisiana from millions of dollars of loss. The second freeze was predicted, or rather announced, two days in advance of its arrival and gave the planters ample time to get ready for their enemy. These warnings saved the greater part of the crop, and were valuable not only for

the present, but for future years, for they enabled the planters to save the seed cane. But for that we would have had to reduce our cane acreage next year.

The county correspondents of the Louisiana Planter furnish some valuable information on this point. Thus from Iberville we learn that a majority of the planters heeded the warning at once, began to windrow the moment the Weather Bureau informed them that a cold wave was on its way here, and they thus saved their crop.

In Assumption a number of planters did not believe the warning, and will lose heavily in consequence of their failure to windrow. But the strongest evidence comes from Lafayette, where the Planter's correspondent remarks:

"Fortunately the United States Weather Bureau gave timely warning of the coming freeze, and those planters who had standing cane were able to put it in windrows before the cold blast struck the county. A few, however, were caught, not fully appreciating the warning and trusting to luck that, after all, Uncle Sam's prediction as to destructive cold approaching might not come true. It is therefore quite certain that there will be some further loss, not only of standing cane, but of much exposed in heap rows."

Probably next time they will give better heeding to these warnings. The weather reports have vindicated themselves and proved their value; and with this protection and notice properly utilized by the planters, the cane crop will be better protected against sudden changes in weather conditions and the cane crops made more certain. The Weather Bureau in its predictions, especially as far as freezes go, has made great progress in the last few years, and we may hope for still further improvement as the science of meteorology progresses.

The following letters tell further of the use made of the warnings.

From W. W. and J. A. Ventress, Granada plantation, Sunshine, Iberville Parish, La.:

> The warning issued on the 28th of November has been of very valuable service to us, as it enabled us to windrow our cane, thereby saving almost all of the crop. The cane now in windrow is as good as the day it was put down, and we are still finding good eyes in the cane, which we find may serve for seed cane. We hope that the Government will continue this service and that we will be able to get the warnings promptly as heretofore.

From R. S. Moore, Riverside orange grove, Naomi, Plaquemines Parish, La.:

> This is the first time I have had the opportunity of writing you to thank you for the very valuable weather warnings of the freezes of November 30 and December 1.
>
> I received your forecasts in plenty of time to prepare against any loss, and I am happy to say that I saved $4,000 worth of fruit. I have always considered the Weather Bureau as most important to farmers and fruit growers, and this last freeze, in which I was timely warned, proves its great value.

DECEMBER, 1911, FREEZE IN CALIFORNIA.

A very severe frost and freeze occurred in southern California during the early morning hours of December 26 and 27, 1911. The citrus crop, valued at $40,000,000, suffered damage to the amount of about $6,000,000, owing to inadequacy of facilities for general smudging. Wherever smudging was general, not only the fruit, but the trees and blooms as well, were saved. But for the frost warnings of the Weather Bureau and the cooperative efforts of the orange growers the loss would have approximated $20,000,000. Mr. A. F. Call, of Corona, Cal., writes in appreciation of the warning as follows:

> The frost warning sent me about 4 p. m. December 25 enabled me to get ready in some orchards not then prepared and to save crops worth at least $10,000. Where smudging was done, it was a complete success.

COLD WAVE OF JANUARY, 1912.

The following weekly forecast was issued December 31, 1911:

> There will be stormy weather the coming week over the North Atlantic steamer routes, the British Isles, and northwestern Europe.
>
> In the United States wintry weather will be general during the greater part of the coming week. A marked change to colder weather will overspread the region east of the Mississippi River within the next 36 to 48 hours, with the line of freezing temperature extending southward to the Gulf and South Atlantic States and to northern Florida. Unseasonably cold weather will continue the next several days in the Middle West, the Southwest, and the Rocky Mountain region.
>
> A storm that is now over the upper Lake region will move down the St. Lawrence Valley during Monday, attended by snow in the region of the Great Lakes, the upper Ohio Valley, the interior of New York, and New England; it will be followed by clearing weather elsewhere east of the Mississippi River during Monday. The next disturbance of importance to cross the United States will appear in the Far West Monday or Tuesday, cross the Middle West Wednesday or Thursday, and the Eastern States Friday; this disturbance will be preceded by a reaction to normal temperature, be attended by general snows in northern and rains in southern districts, and be followed by decidedly colder weather.

During the week following the issue of this forecast a general cold wave swept the country, and the lowest temperatures for several years were reported from the upper Mississippi Valley and the upper Lake region. Much suffering was caused by cold weather from the Plains States eastward to the Atlantic coast.

The following from Mr. A. Mitchell, jr., general agent of the Chesapeake & Ohio Railway Co., Lexington, Ky., dated January 13, 1912, refers to warnings of heavy snow issued by the Weather Bureau:

> We wish to thank you very much for the forecasts we received from your department, especially for the information given us during the past 10 days. They have not only enabled us to protect and safely handle many shipments of perishable commodities, but your forecasts, both as to the severe weather and the snows, enabled us to protect in advance, especially at our shops and at our terminal yards, where we have a great many switches, to such an extent as to keep the invariable interference to the safe movement of transportation down to a minimum.

The following is an extract from an editorial that appeared in the Pittsburgh Gazette-Times of February 24, 1912, regarding the warnings issued in connection with the storm of February 21 and 22, 1912, which swept the Atlantic seaboard:

> A striking illustration of the important part played by the Government Weather Bureau was furnished by the warnings issued in connection with the recent severe storm along the Atlantic coast. Shipping interests were advised in ample time that high winds of almost hurricane proportions were on the way. In many cases small vessels remained in port until after the danger was past. Ships at sea were warned by wireless and were able to prepare for the big blow. It is impossible to estimate the protection to life and property afforded by this up-to-date, efficient service. The instance mentioned was of a rather unusual and even spectacular nature, but every day in the year the Weather Bureau, from headquarters at Washington and through its employees throughout the country, is making careful observations, receiving and exchanging reports and issuing bulletins and warnings to shippers of perishable goods, railroad and marine interests, and others directly concerned with impending changes in meteorological conditions.

RIVER AND FLOOD DIVISION.

RIVER AND FLOOD SERVICE.

A new river district comprising the watershed of the San Joaquin River, formerly a portion of the Sacramento (Cal.) district, was created on March 1, 1912, with headquarters at Fresno, Cal. Greater promptness and efficiency of service, without any material increase in cost of operation, will result from this division. Owing to a change in the classification of the station at Moorhead, Minn., the river work of that district was transferred to the station at Devils Lake, N. Dak., on April 1, 1912. The change will not involve any increase in expense.

One cooperative and 28 paid river stations were established during the year and 10 paid stations were discontinued. Three paid rainfall stations were established and 4 discontinued. On June 30, 1912, river and rainfall observations were made at 483 regular Weather Bureau and special stations, of which 16 are cooperative stations. Rainfall observations were made at 93 special stations, of which 12 are cooperative stations.

No extensions of moment are contemplated during the coming year. A new district center will be opened on July 1, 1912, at Fort Wayne, Ind., with territory comprising the watershed of the Maumee River. As the new district is now a portion of the Columbus (Ohio) district, no additional expense will be involved beyond that necessary for two new special stations.

The river forecast schemes for the Ohio River and its tributaries were completed during the year and are now in use. Schemes for the interior rivers of the State of Ohio were also completed, and the scheme for the Savannah River is nearing completion. It is proposed to take up the study of the Mississippi soon, with a view to the preparation of similar schemes for that river.

Floods were frequent and widespread during the year, the rivers of the Pacific Coast States alone escaping on account of deficient precipitation. March was the month of greatest flood frequency. Nearly every stream east of the Rocky Mountains was in flood at some time during the month, except those along the immediate eastern slopes and in the northern and eastern Lake region. The floods were due to an excess of precipitation, ranging from 2 to 4 inches, falling upon saturated soil south of the Ohio River and upon frozen ground to the northward. Some floods were due to ice, but they were confined to the northernmost tier of States, and were not of great importance. The greater floods were caused by a remarkable series of storms that moved northeastward from the extreme Southwest over the Ohio Valley to the north Atlantic coast. Storms of this type are invariably accompanied by heavy rains, and when they are separated by intervals of a few days only floods are inevitable.

The flood in the lower Mississippi River was the greatest in its history. All high-water marks were exceeded from Cairo to the Passes, except in the vicinity of Vicksburg, Miss., where extreme conditions were moderated by crevasses in the levees above. The floods began in March, but did not reach their maximum at New Orleans until May 11; at the end of June flood waters were still flowing through the Hymelia Crevasse, 32 miles above New Orleans. Of the 30,000 square miles of territory subject to overflow, about 17,600, or

59 per cent, were flooded. The losses will exceed $75,000,000, and may possibly reach $100,000,000, of which much the greater portion represents the loss of the season's crops. In its forecasts of the flood stages and in its warnings of impending danger to the people of the threatened districts the Weather Bureau maintained the high plane of accuracy that has characterized its work during all the great floods of the Mississippi River since that of 1892. The forecasts and warnings were prompt, conservative, and accurate, and through them many lives were saved. As to the value of property saved through the warnings, it is difficult to arrive at a correct estimate, but from such reports as were obtainable it appears that $16,000,000 is a reasonable figure, and later reports may increase this amount. The first warning for the flood was issued on March 20, the last on June 8, and at the beginning of April it was announced that the floods would be the greatest in the history of the lower Mississippi Valley. The forecast for the river at New Orleans was issued nearly five weeks in advance of the occurrence of the crest stage, and its absolute accuracy was a triumph of forecasting skill. The press of the country has paid ample tribute to the work of the Weather Bureau in connection with the flood.

A report on the Mississippi flood, now in course of preparation, will be prepared jointly by the Department of Agriculture, the War Department, and the Interior Department. Each department concerned will deal only with such features as come within its particular province, and the combined report will be submitted to the President of the United States.

Although overshadowed by the lower Mississippi calamity, floods were of frequent occurrence elsewhere, except during November and December, and were forecast with the usual timeliness and accuracy. The river and flood service work in the Wisconsin Valley in October, in southern Michigan in April and May, and in the southern rivers generally during the spring months is deserving of special mention.

Persistent effort has been made to secure accurate data regarding the loss from floods. It is naturally impossible to obtain exact figures, and estimates are at times difficult to obtain. The total flood losses reported during the year were about $86,000,000, of which, however, only about $11,000,000 were incurred outside the lower Mississippi Valley. These figures are far from complete, and it is reasonably certain that if losses along small streams were reported and more detailed statements were obtained from the lower Mississippi Valley the total would be brought up to at least $100,000,000, as against a total of less than $8,000,000 for the year ended June 30, 1911. The total value of property saved through the Weather Bureau flood warnings was estimated at $19,000,000.

MOUNTAIN SNOWFALL WORK.

The measurement of the amount of snowfall in the mountain regions of the West was continued during the year. On June 30 there were 271 paid stations and 1 cooperative station in operation. During the year 1 cooperative and 7 paid stations were established and 17 paid stations were closed.

The measurement of mountain snowfall in winter is made for the purpose of determining the amount of water that is likely to be available for agricultural and commercial purposes during the spring and summer seasons. The work is still in a formative state, but experiments with the special apparatus devised by Prof. Marvin have, in the main, proved satisfactory; and if funds can be provided for the purchase and installation of a supply of Marvin snow gauges and apparatus sufficient for all the stations, it is thought that the work can be placed on a permanent basis, and that acceptable forecasts of water supply can be made each spring over the various watersheds. Opinion regarding this subject is strengthened by an inspection of the results of the special snow surveys in the watershed of Maple Creek, Utah. The forecast based on the survey and measurements made in the spring of 1911 was of much value to the water users, and a second survey and measurements made in the spring of the present year promises equally valuable results.

FORESTS, CLIMATE, AND STREAM FLOW.

The work of the forest experiment station at Wagon Wheel Gap, in the Rio Grande National Forest, Colo., has made satisfactory progress. It will be remembered that this station is maintained jointly by the Weather Bureau and the Forest Service for the purpose of studying the effect of forests upon stream flow and climate. There had been some fears that the precipitation at such great elevations (9,200 to 11,000 feet above sea level) and in a supposedly semiarid region would not be sufficiently heavy to afford a basis for legitimate comparison with data obtained from the more humid regions of the East; but now that complete data for nearly two years have been obtained, it appears that these fears were more or less unfounded. The total precipitation for 1911 at the principal station of observation was 23.80 inches; over watershed A, 26.88 inches; over watershed B, 27.33 inches; and at the summit or head of both watersheds, 28.56 inches. These data compare favorably with those from other portions of the country and indicate that the final results will permit of more general application than at first supposed.

The cooperative stations in the Coconino National Forest in Arizona and in the Fremont National Forest in Colorado were also continued during the year, and limited equipment was provided for additional stations in the Kaniksu National Forest in Idaho, the Manti National Forest in Utah, the Cloquet National Forest in Minnesota, and the Plumas National Forest in California. Data from these stations will be available for study in connection with the more elaborate and complete data from the station at Wagon Wheel Gap.

DIVISION OF OBSERVATIONS AND REPORTS.

This division supervises the observational work of the bureau and the preparation of maps for the forecaster. It has charge of the dissemination of forecasts and storm warnings both on the land and on the ocean, and of frost warnings for the farming, trucking, fruit, and cranberry interests. It has supervisory control of station and commercial maps and of the placing of glass maps, bulletin boards, and kiosks. It also has full charge of the marine meteorological work of the bureau and of the Hydrographic Office, comprising the collecting of all observational reports and the issuing of ocean meteorological charts based on those reports, the radiotelegraphic service used for transmitting observations, the dissemination of forecasts to and charting of reports from vessel weather stations, and the vessel-reporting service on the Atlantic, Pacific, and Gulf coasts and the Great Lakes.

At the close of the year there were 197 regular observing and 3 repair stations in operation. Of the 197 stations, 167 take two observations a day, 22 take one observation in the morning, and 8 take one evening observation daily. These observations are telegraphed to Washington and over circuits to other stations, for use in making the daily weather and commercial maps and in preparing the forecasts and frost warnings issued to the public.

SPECIAL METEOROLOGICAL STATIONS.

In addition to the 197 regular observing stations there are 75 special meteorological stations, with paid observers in charge. Fifty-two of these are maintained as adjuncts to the work of the forecaster in making special frost predictions for the fruit and trucking interests of Oregon, Washington, Utah, Idaho, Colorado, North Carolina, California, and Florida, and precipitation predictions for the vineyard interests of California. Eight stations are in operation in the cranberry bogs of Wisconsin, Massachusetts, and New Jersey, these interests being looked after by the officials in charge of the stations at Chicago, Boston, and Atlantic City, respectively. Six special stations in Alaska telegraph evening observations daily to aid in the general forecast work of the service; these reports are of special value in making the weekly weather forecasts. One additional station in Alaska is used as a distributing center in connection with ocean meteorological work, while the reports from eight special stations in the West Indies, rendered from July 1 to November 15, are of great value to the forecaster in connection with the prediction of tropical storms during the hurricane season.

Of the 158,636 observations due from the 272 stations during the year, only one was missed, and that through an accident to the observer. Seven were taken from 15 to 30 minutes late, eight from 30 minutes to 1 hour late, and fourteen from 1 to 2 hours late. In most instances these delays were unavoidable. No better evidence than this could be advanced in illustration of the excellent discipline of the observers and of the spirit of promptitude and devotion to duty that animates the entire service.

In addition to the paid meteorological stations, there are 33 cooperative stations that render reports in connection with the special interests of their respective sections; of these, 2 are special meteorological stations, 22 are special fruit district stations, 1 is a special cranberry-marsh station, and 8 are West Indian stations.

No regular Weather Bureau stations of the first order were opened during the year. Four special meteorological and 22 fruit stations were established. This special fruit-district station service is being rapidly developed in connection with special investigations carried on under the direction of the officials at Chicago, Raleigh, Portland (Oreg.), San Francisco, Salt Lake City, Grand Junction, Jacksonville, and Columbus (Ohio).

In the mountain orchard districts of North Carolina study is being made of the thermal belts in the Blue Ridge Mountains. After a careful inspection by Weather Bureau officials from Chicago and Raleigh, accompanied by Mr. Hutt, State horticulturist of North

Carolina, the following places were selected for the establishment of stations:

Asheville, N. C., with 4 substations.
Blantyre, N. C., with 3 substations.
Blowing Rock, N. C., with 4 substations.
Globe, N. C., with 2 substations.
Gorge, N. C., with 3 substations.
Mount Airy, N. C., with 3 substations.
North Wilkesboro, N. C., with 3 substations.
Transon, N. C., with 2 substations.
Tryon, N. C., with 3 substations.
Waynesville, N. C., with 2 substations.

Each of these stations is equipped with an instrument shelter, a thermograph, and maximum and minimum thermometers. In addition, the home station has a rain gauge, a sling psychrometer, and an extra minimum thermometer exposed outside the shelter. The instruments at the home station are read once daily, while those at the substations are read weekly, the observations being continued throughout the year.

These stations are variously located along the slope of the mountains up to 4,000 feet above sea level, the range between the elevation of the home station and the highest substation being about 1,000 feet. A further extension of the service in North Carolina is planned for the coming year.

Under the Portland (Oreg.) center are grouped seven localized centers for fruit frost investigation and distribution of frost warnings:

1. In the Rogue River Valley around Medford, Oreg.
2. In the Umpqua Valley around Riddles, Oreg.
3. In the Stuck River Valley around Tacoma, Wash.
4. In the Yakima Valley around North Yakima, Wash.
5. In the Snake River Valley around Lewiston, Idaho.
6. In the Boise Valley around Boise, Idaho.
7. In the Hood River Valley around Hood River, Oreg.

Medford, in the Rogue River Valley, is the key station for that district, with the three cooperative stations at Ashland, Jacksonville, and Grants Pass, Oreg., taking observations during the frost period, or when specially called on. Observations are taken at Medford throughout the year. Riddles, Oreg., in the Umpqua Valley, is the distributing center for warnings for that section. The service in the remaining valleys has the same general system of reporting stations, working in conjunction with a central station, from which warnings are distributed to the surrounding fruit interests liable to be injured by expected frosts or low temperatures.

The supervision of five special fruit-district stations around Los Angeles was transferred to the San Francisco district during the past year. The San Francisco center now has charge of the fruit-district stations of the northern and central counties and the citrus fruit districts of the south. It is hoped soon to provide for a material extension of this service into the fruit districts of the San Gabriel, Santa Clara, San Joaquin, Sacramento, and Bay Valleys. Experiments with improved heaters are needed, so as to utilize the warnings to the fullest extent. Plans are being made for experiments with coverings as a plant protection.

The experiments in protecting fruit from frost by the use of canopies, begun at Provo, Utah, two years ago, have been continued by the Weather Bureau official at Salt Lake City, who has extended them so as to include the covering of trees with three different kinds of cloth, and taking the temperature observations both inside and outside the coverings. He is planning to continue these experiments during the coming year, and to extend his studies to include the protection of vegetables and alfalfa from frost.

The frost-warning service has been continued in the Grand River Valley and extended to include the Gunnison Valley. Paid stations were established at Delta, Paonia, and Montrose, Colo., taking observations during May and June of this year only. Observations from these stations were telegraphed to Grand Junction and forecasts from Denver were amplified and distributed to the fruit interests. Special frost warnings were also sent to Hotchkiss.

Some frost-protection work was done in the vineyard districts of Ohio during the year by the official in charge at Columbus, in cooperation with the State agricultural experiment station. A further extension of the service is planned.

The frost-warning service for the protection of trucking and citrus fruit in Florida was continued without material change by the Weather Bureau official at Jacksonville.

Requests for the establishment of additional special meteorological stations in investigating frost protection were received during the year, but the lack of funds prevented further extensions. Dr. J. R. Guerrant desired a station at Callaway, Va., for conducting investigations in the Blue Ridge orchards. The Oregon Agricultural College requested assistance in frost investigations in the Umpqua Valley. The Appalachian Apple Orchards Co., of Atlanta, wanted a station at Tallulah Falls, Ga., and from Mosier, Oreg., Inman, S. C., Legerwood, N. C., and Grossnore, N. C., similar requests were received.

The special service for the protection of cranberries from frost in the bogs of the Cape Cod district is now well organized. Special stations report to Boston, from which point frost warnings are distributed to the cranberry interests. These bogs are the most extensive in this country, and the cranberry growers rely upon the warnings of the Weather Bureau in making preparations for the protection of their crops from frost.

Special cranberry stations are maintained in Wisconsin at Berlin, Mather, and Grand Rapids, under the supervision of the Chicago center. The Wisconsin State Cranberry Growers' Association has warmly expressed its appreciation of the work of the bureau in that State.

The station at New Lisbon, N. J., has been continued during the year for the protection of cranberries of that district.

At Seaview, Wash., a cooperative station was established under the Portland, Oreg., center for investigation into the frost conditions of the cranberry bogs.

Special stations conducted for the benefit of the cotton, corn, wheat, sugar, and rice interests will be described later.

FORECAST DISTRIBUTION.

Weather forecasts are issued daily from Washington, Chicago, New Orleans, Denver, San Francisco, and Portland (Oreg.). From these centers the forecasts are telegraphed to 2,059 regular Weather Bureau stations and forecast distributing centers, from which points the forecasts are made available by telegraph and telephone to 5,465,032 subscribers and others, and by rural free delivery and mail to 120,050 places. In addition to this, special frost and emergency warnings are sent to 6,100 addresses. There was an increase of 89 in the number of places receiving the forecasts at Government expense, while the distribution by free telephone was increased nearly a million, and by mail forecast cards, 2,500.

Distribution of daily forecasts and special warnings.

State.	At Government expense.			Without expense to Government by—				
	Forecasts and special warnings.	Special warnings only.	Emergency warnings only.	Mail.	Rural delivery.	Telephone.	Railroad train service.	Railroad telegraph.
Alabama	24	7	136	1,450	337	43,907	0	10
Arizona	8	1	0	122	0	4,661	0	0
Arkansas	24	9	102	845	562	48,460	0	11
California	84	25	10	2,600	54	0	0	0
Colorado	9	63	41	1,124	1,080	84,300	0	1
Connecticut	5	0	72	2,116	50	75,000	140	0
Delaware	8	1	16	150	300	4,865	0	27
District of Columbia	0	0	0	1,285	0	20,000	0	0
Florida	34	107	52	1,367	225	22,201	0	240
Georgia	49	32	239	1,835	600	58,669	0	161
Idaho	12	0	0	285	200	18,782	0	0
Illinois	113	47	226	3,135	3,264	586,125	0	1
Indiana	93	2	74	2,659	510	239,890	0	0
Iowa	139	8	455	1,850	2,057	243,059	0	0
Kansas	92	2	175	1,721	785	136,383	0	0
Kentucky	69	32	99	1,773	100	54,400	0	0
Louisiana	76	22	48	637	0	32,136	0	18
Maine	11	1	58	1,190	180	24,000	0	0
Maryland	15	49	46	2,248	285	7,900	0	281
Massachusetts	13	13	78	3,158	110	150,000	80	0
Michigan	59	1	0	4,680	719	430,732	181	407
Minnesota	73	3	171	2,384	1,839	159,599	0	13
Mississippi	47	7	59	1,361	1,434	24,900	9	6
Missouri	27	2	236	5,539	0	391,050	0	1
Montana	12	19	13	428	0	19,500	0	5
Nebraska	71	9	205	2,188	420	210,702	0	0
Nevada	5	0	0	57	0	1,200	0	0
New Hampshire	15	0	44	693	775	14,980	15	0
New Jersey	20	17	105	1,484	265	39,064	0	179
New Mexico	8	2	0	135	0	10,500	0	17
New York	109	49	409	9,358	661	735,352	0	118
North Carolina	60	59	187	1,310	1,500	35,000	0	0
North Dakota	25	3	93	500	1,800	15,000	0	150
Ohio	70	147	237	7,291	323	450,000	0	0
Oklahoma	30	1	0	680	343	3,965	0	160
Oregon	10	7	0	492	218	13,000	0	0
Pennsylvania	76	42	315	6,475	1,393	491,700	0	452
Rhode Island	1	0	14	221	0	2,560	13	0
South Carolina	32	11	105	935	375	33,376	0	39
South Dakota	51	9	70	875	7	46,000	0	2
Tennessee	47	3	222	1,867	2,863	65,741	0	0
Texas	85	65	227	1,347	773	201,305	0	0
Utah	6	26	0	212	325	34,106	1	0
Vermont	12	0	54	906	425	22,475	12	0
Virginia	56	6	84	1,730	1,797	26,882	0	44
Washington	22	21	0	847	400	3,551	0	0
West Virginia	34	8	55	994	0	50,969	0	0
Wisconsin	106	6	309	2,653	1,184	67,330	0	0
Wyoming	12	2	13	320	0	6,935	0	0
Total	2,059	946	5,154	89,512	30,538	5,462,212	451	2,343

STORM-WARNING DISPLAY STATIONS.

Eighteen storm-warning display stations were established on the ocean and lake coasts during the past year and six stations of this class were discontinued.

Storm warnings were discontinued for the winter on the Great Lakes December 6, 1911, and resumed April 25, 1912.

The usual advance arrangements have been made for the dissemination of hurricane warnings on the Atlantic and Gulf coasts by the displaymen, by rockets, messages, and other suitable means. The following special instructions, issued on September 28, 1911, indicate the action authorized to be taken at the storm-warning centers in order to make these warnings of the greatest possible value in the protection of life and property:

> When an order to hoist the hurricane warning is received at any station every effort will be made to give the warning the widest possible distribution, especially among vessels in the harbor and persons occupying isolated or dangerous points that can not be communicated with by telegraph or telephone. Vessel masters will be notified that it is dangerous to leave port. In the distribution of such warnings officials in charge of stations are hereby authorized to incur any reasonable expense, such as hire of boats, tugs, horses, automobiles, and special messengers, not to exceed $200 for any one occasion, without special telegraphic authority. A telegraphic report of such measures, with a statement of the expense incurred, will promptly be made to the central office.

The following statement gives the number of stations, arranged under district centers, receiving storm warnings:

District centers.	Paid stations.	Cooperative stations.	Weather Bureau stations.	Naval wireless stations.
Alpena, Mich	5	0	1	0
Atlantic City, N. J	0	4	1	1
Baltimore, Md	3	1	0	0
Block Island, R. I	1	0	1	0
Boston, Mass	25	11	2	5
Buffalo, N. Y	12	1	1	0
Cape May, N. J	1	0	1	0
Charleston, S. C	5	1	1	0
Chicago, Ill	25	3	1	1
Cleveland, Ohio	10	1	1	0
Corpus Christi, Tex	2	0	1	0
Detroit, Mich	0	1	1	0
Duluth, Minn	7	0	1	3
Eastport, Me	0	1	1	0
Erie, Pa	1	0	1	0
Escanaba, Mich	2	0	1	0
Eureka, Cal	0	1	1	1
Galveston, Tex	5	7	1	1
Grand Haven, Mich.[1]	0	0	1	0
Grand Rapids, Mich.[1]	0	0	1	0
Green Bay, Wis.[1]	0	0	1	0
Hartford, Conn.[1]	0	0	1	0
Houghton, Mich	3	3	1	0
Jacksonville, Fla	8	14	1	1
Key West, Fla	0	2	2	1
Los Angeles, Cal	1	3	1	0
Marquette, Mich	1	0	1	0
Milwaukee, Wis	9	0	1	0
Mobile, Ala	4	4	1	0
Nantucket, Mass.[1]	0	0	1	0
New Haven, Conn	3	0	1	0
New Orleans, La	3	2	1	0
New York, N. Y	4	6	1	2
Norfolk, Va	6	5	4	1
Oswego, N. Y.[1]	0	0	1	0
Pensacola, Fla	3	0	1	0
Philadelphia, Pa	3	1	1	0
Port Huron, Mich	3	1	1	0
Portland, Me	3	2	1	0
Portland, Oreg	10	4	5	1
Providence, R. I	1	0	1	0
Rochester, N. Y.[1]	0	0	1	0
San Diego, Cal	0	3	1	1
Sandusky, Ohio[1]	0	0	1	0
San Francisco, Cal	2	9	4	3
San Juan, P. R	0	2	1	2
Saulte Ste. Marie, Mich	5	0	1	0
Savannah, Ga	4	1	1	1
Tampa, Fla	2	6	1	0
Toledo, Ohio	0	1	1	0
Washington, D. C	2	0	1	0
Wilmington, N. C	3	3	1	0
Total	187	101	63	25

[1] Not centers.

SMALL-CRAFT WARNINGS.

A new warning for the protection of small craft, such as those engaged in fishing, towing, motor boating, and yachting, from danger from moderately strong wind was designed during the year, and nine small-craft cooperative stations were established. A red pennant, displayed during the day only, is flown to warn these interests.

STATION WEATHER MAPS.

The policy of publishing the commercial weather maps in the daily papers in order to give the reports and information furnished by the Weather Bureau wider distribution than obtainable by any other means has continued during the year. At its close there was a net increase of 20 papers publishing the map, as compared with the number for the previous year. The commercial map is now published at 106 cities and towns, in 147 papers having a total daily circulation of 2,904,704. This large distribution is entirely without expense to the Government except for the preparation of the original casts, and means the placing of weather information before the reading public at a great saving of funds that can be utilized in the extension of the bureau's work in other directions.

Daily weather maps are issued direct from 59 stations, with a total daily circulation of 20,550. Since the publication of the commercial map was begun, the station map has been discontinued at 51 stations.

Glass weather maps were installed during the year at Chicago, Evansville, New York, Tampa, Peoria, Fort Wayne, and San Antonio, and are now changed daily in 59 places at 45 stations. The usual points of display are cotton exchanges, fruit and produce exchanges, chambers of commerce, boards of trade, maritime exchanges, and customhouses. The high value attached by commercial organizations to this elaborate means of portraying general weather conditions is evidenced by the following extracts from letters received:

From the secretary of the Tampa (Fla.) Board of Trade:

> I have not written you before to acknowledge the receipt of the large glass weather map, which has been installed on the first floor of the board of trade building, as I desired to wait a week and see what interest the public took in this excellent method of showing the weather of the United States daily. I expected in the winter time when we have 10,000 tourists in Tampa that the map would be surrounded all day long by our friends from the North, but I did not expect such an interest in it during the summer time. The map is so attractive that it commands attention, and it is located just back of a plate-glass window, and each day there are hundreds who stop to study the weather conditions as stenciled on the map.
>
> I wish to assure you that the board of trade appreciates your efforts to have this map installed here; and I also know that the public appreciates it and it will go a long ways toward acquainting the public with the maps in the papers, as the weather map is done in colored chalk.

From the secretary of the Savannah (Ga.) Cotton Exchange:

> Full information of the weather that prevails all over the cotton belt and the forecast of what may be expected to come is not only valuable information but is highly important to the trade; we are very anxious about the forecast, and the large glass weather map is now the most popular point of the exchange, and the map is surrounded by a crowd while it is is being made up.

From the secretary of the Evansville (Ind.) Business Association:

> The large glass weather map is a great attraction, and it has proved so interesting to a great many of the business men that they come to the association rooms daily to observe the weather conditions throughout the country, and also to carefully study the map.

From the secretary of the Vicksburg (Miss.) Cotton Exchange:

> You can not imagine how important a center our glass weather map is just now. Planters, Government engineers, and business men consult it many times a day, especially in regard to the weather and its effect on the present high water.

In other cities blackboard maps and bulletin boards are changed daily in 13 places at 11 stations. New bulletin boards were installed during the year at Evansville and Kansas City.

MARINE WORK.

OCEAN METEOROLOGICAL CHARTS.

The meteorological charts of the oceans, prepared by the Weather Bureau, are distributed to mariners, maritime exchanges, and meteorological institutions throughout the world, and their receipt is frequently acknowledged with assurances of their value to the interests served. The charts are also furnished by request to many schools, colleges, public libraries, and meteorological societies.

The meteorological charts for the north Atlantic, north Pacific, and Indian Oceans and for the Great Lakes are published monthly, while those for the south Pacific and south Atlantic Oceans are issued quarterly. The charts contain on the face a statement of all the meteorological elements of the oceans, together with the sailing routes of vessels, lines of magnetic variation, and the location of the radiotelegraphic stations of the world, and of the storm-warning stations of the United States and other countries. During the past year articles have appeared on the reverse side of the north Atlantic and north Pacific charts on water-surface temperature, air temperature, and ocean currents for each month. Similar data are in course of preparation for publication on the south Atlantic and south Pacific charts.

The meteorological data used in the preparation of these charts are collected from the vessels of all nations, and the land and island stations of all countries bordering on the ocean. The observers forward their reports through the local offices of the Weather Bureau or, when in foreign ports, through the American consular offices. The American consuls at all the principal ports are furnished with a full supply of meteorological forms, and act as agents for the Weather Bureau in their distribution. During the past year 2,291 vessels, representing 24 different nationalities, have cooperated with the Weather Bureau and furnished monthly reports of observations. Reports are also received from 261 land stations, making a total of 2,552 cooperative observers. This work is entirely gratuitous, the only return given being in the form of meteorological charts and other publications issued by the bureau. These cooperating vessels furnished 12,600 meteorological reports during the year, which have called for 3,259 letters of acknowledgment from the Washington office. Reports received through the marine centers are acknowledged by those centers, and often in person, as our agents visit the vessels upon their arrival in port. Three thousand barometer cards, containing comparative barometer readings, have been received and corrected, and tags giving the corrections of the barometers have been furnished each vessel.

The bureau maintains marine centers at 23 seaport towns on the ocean and Gulf coasts and 19 on the Great Lakes, at which points meteorological charts and supplies are distributed to the cooperating vessels. At New York, Boston, Philadelphia, Seattle, and New Orleans assistants are specially assigned to visit vessels, instruct the observers, make comparisons, and furnish general information. The official at Seattle has supervision over the meteorological work of all vessels entering Puget Sound.

The following are extracts from letters commendatory of the charts:

Mr. V. le Toumelin, of the French steamship *Cacique:*

> I have been sending reports five years, and am too glad to receive your charts and rely on them.

Capt. W. A. Haughton, R. N. R., commander of the steamship *Persia:*

> I can not express to you how valuable these charts are to a seaman, and beg to compliment you on the production of such valuable aids to safe navigation.

Acknowledgment is due to the meteorological services of other countries for furnishing reports on ocean meteorology and other special data. The bureau is also indebted to Mr. H. C. Thomson for valuable information relative to the fogs of Newfoundland and the higher latitudes of the north Atlantic Ocean. Mr. Thomson has made a study of the subject in connection with the contemplated establishment of a railway through Newfoundland and a northern steamship route to Europe.

VESSEL WEATHER SERVICE.

On April 1, 1912, the bureau inaugurated on the Atlantic and Gulf coasts a vessel weather service on 30 vessels sailing between New York and New Orleans and points in the West Indies and South American ports. This special service on 23 of the vessels was placed under the supervision of the official at New York and on 7 under that of the official at New Orleans. The vessels were equipped with aneroid barometers, and the observer on each takes two observations daily, one at 7 a. m. and the other at 7 p. m., seventy-fifth meridian time, when the vessel is 75 miles from the port of departure or port of entry, and radiographs them to the nearest wireless station on the coast, from which point they are sent over the land lines to Washington. For this service the observers are paid 50 cents for each observation. The transmission of the messages from the vessels and their transfer to the land line stations is done without cost to the bureau, through cooperation by the naval wireless, Marconi, the United Wireless, and the United Fruit radiotelegraph service, to which companies thanks are extended for the many courtesies shown. The steamers cooperating in this work are operated by the United Fruit Steamship Co., the New York & Cuba Mail Steamship Co., the Mallory Steamship Co., and the Panama Railroad Steamship Line.

Vessel weather service has also been started on the Pacific coast on vessels of the Nippon Yusen Kabushika Kaisha, plying between the Orient and points on the Pacific coast. The Japanese Government offered to take up the work free of cost, except for land tolls, and has issued instructions to all its vessels to make reports to our officials at San Francisco and Portland.

At San Francisco the daily forecasts are distributed by the United Wireless at stated times each day to vessels at sea.

At San Francisco 321 vessel reports were received during the year, but the official states that most of the reports were of little value in connection with his forecast work. Reports from coastwise steamers were of interest to the public and were published in the papers. The maximum distance from which reports were received was 1,440 miles.

At Portland, Oreg., reports were received from 534 vessels, of which 176 were of benefit to the forecaster in connection with his work and 358 of only slight value. Forecasts made at Portland are sent over the Port Crescent Lines to Tatoosh Island, where they are delivered to the Naval Wireless station for distribution to vessels at sea and to points along the coast.

RADIOTELEGRAPH SERVICE.

The bureau is in close cooperation with the Naval Wireless, the United Wireless, the Marconi, and the United Fruit Telegraph services on the Atlantic, Gulf, and Pacific coasts. Instructions have been issued to the stations of these services to forward immediately to Washington all weather information received, and special hours have been set aside for the broadcast dissemination of forecast messages and storm warnings over the ocean. Even when information relating to a disturbed condition of the weather at sea is contained in a private message, the operator at the radio station has been instructed to request the master of the vessel to make a weather report. The proposed extension of wireless weather service to cover the entire north Atlantic Ocean, through international regulation and cooperation, has already been referred to.

VESSEL-REPORTING SERVICE.

In addition to their meteorological duties, the officials at the stations at Block Island, Cape Henry, Sand Key, Southeast Farallon, Point Reyes Light, North Head, Port Crescent, and Tatoosh Island are required to report all passing vessels, wrecks, and marine disasters, and to transmit communications between masters, owners, underwriters, and others interested in marine matters. All of these stations are prepared to transmit messages by telegraph, and all except Block Island and Port Crescent are equipped for day signaling by the international code. Cape Henry and Sand Key are also equipped for night communication by flash light, Morse code.

Cape Henry uses the telegraph and telephone in reporting all vessels to Norfolk and Newport News. The names of the vessels passing that station are also furnished to the Norfolk press and the New York Maritime Exchange. All naval vessels are reported to Norfolk, and in some cases a report is made to the Navy Department at Washington. Vessels bound for Baltimore are reported to the Maritime Exchange of that city. The Virginia and Maryland pilot associations cooperate with this station. Cape Henry has a list of 100 associations, firms, and individuals to receive notice of passing vessels.

A time flag is dropped at the station each day at noon for the benefit of the pilot boats and vessels in the offing. During the year 17 wrecks were reported to various ship companies, maritime exchanges, and individuals. The Cape Henry office receives information of wrecks from the 25 life-saving stations between Cape Henry and Hatteras Inlet and from the wireless station at Hatteras, and reports by telephone to the revenue cutters and to wrecking companies, so that they may render immediate assistance.

Block Island sends reports to 12 firms and associations. Four wrecks were reported by this station during the year.

Sand Key transmitted orders for 72 vessels and gave notice of three casualties during the year. Ten firms and associations receive reports from this station.

Tatoosh Island reports all passing vessels through the main station at Port Crescent to Seattle, Portland, and San Francisco stations and through the Naval Wireless station to Victoria Wireless station.

Port Crescent reports passing vessels, casualties, etc., to 10 firms and associations in Seattle, San Francisco, Port Angeles, Wash., and Victoria, British Columbia.

The following extracts from reports received during the year furnish instances of special service rendered by these stations to vessels in distress:

Sand Key, Fla., January 29, 1912.—British schooner *Sea Gull*, Bonacco to Key West, went ashore at Sand Key, Fla. Cargo of bananas and 16 passengers from Grand Cayman. Revenue cutter, notified by this office, went to assistance and towed schooner into this harbor.

Tatoosh Island, Wash., June 22, 1912.—At 4.30 a. m., while taking a. m. observation, sighted the American brigantine *William G. Irwin*, bound from Roche Harbor, Wash., to San Francisco, Cal., with lumber and lime. She was lying just off Mukkaw Bay, about 5 miles south of station, an unusual position for a sailing vessel. A very light wind, almost calm, prevailed, and the incoming tide was carrying her slowly into the bay. A close watch was kept on her, and about 9 a. m. she ran up her ensign, evidently for assistance. I immediately requested the wireless station to get into communication with the revenue cutter *Snohomish* at Neah Bay and notify her of the *Irwin's* position, which they did. *Snohomish* proceeded at once to Mukkaw Bay and towed the *Irwin* to a safe offing. No damage. Commander of *Snohomish* reports that *Irwin* was fast setting in toward rocks when he arrived.

September 14, 1911.—Small fishing launch capsized while leaving anchorage at this point. Notified life-saving crew at Neah Bay and assisted in holding boat on beach until they arrived. Small damage to boat and no injury to persons.

Port Crescent, Wash., March 1, 1912.—The launch *Pearl*, with scow load of machinery, dragged her anchors and went ashore in Crescent Bay. The life-saving tug was at once notified. The *Snohomish* pulled the launch off at 2.30 p. m. without damage. The scow was unloaded on the beach and floated by the *Snohomish* several days later without damage.

North Head, Wash., August 2, 1911.—The schooner *Americana*, with a crew of 18 men and a cargo of 1,000,000 feet of lumber, bound from Astoria, Oreg., to Australia, nearly drifted ashore inside Tillamook Rock during a calm. She was saved from almost certain destruction by the action of the observer, who discovered her plight and sent an urgent call for tugs, which arrived in time to render the necessary assistance.

January 13, 1912.—At 9 a. m. the four-masted schooner *The Admiral*, bound from Valparaiso, Chile, to Grays Harbor, Wash., in ballast, turned turtle and drifted ashore, a total wreck. This station notified the life-saving crew at Fort Canby and the bar tugs at Astoria, Oreg., who rescued the crew from the jetty and attempted to save the vessel. The observer also kept the Portland marine interests posted over the Seacoast Telegraph Line.

The following is the number of vessels reported by each vessel-reporting station during the year:

Block Island	5	Sand Key	1,813
Cape Henry	19,876	Southeast Farallon	31
North Head	1,619	Tatoosh Island	2,459
Point Reyes Light	1,206		
Port Crescent	622	Total	27,631

CLIMATOLOGICAL DIVISION.

METEOROLOGICAL AND CLIMATOLOGICAL REPORTS.

The Annual Report of the Chief of the Weather Bureau for 1910–11 was prepared and printed, as were also the regular issues of the Monthly Weather Review. The demand for the separates of the Review has continued to increase, the edition of the several parts now amounting to 14,729 each month.

The issue of the National Weather Bulletin weekly during the crop-growing season and monthly during the remainder of the year continued as in past years. The demand for this bulletin has likewise shown a healthy increase, the edition now exceeding 4,000 copies.

The snow and ice bulletins issued during the past winter were of uncommon interest on account of the severe cold and the unusual amount of ice reported on the lakes and rivers. In view of this condition it was found advisable to continue its issue until the first week in April. Likewise the special report issued at Detroit during the early spring as to the condition of the ice on the Great Lakes was continued until the latter part of April because of the unusually late date at which the ice broke up.

Snow bulletins for the Mountain States of the Far West were issued as in the past, additional effort being made to show the snow condition in more detail as a basis for forecasting the season's available water supply for irrigation and other purposes.

The monthly climatological reports and weekly bulletins for the Territories of Hawaii and Porto Rico, and for the State of Iowa in conjunction with the weather service of that State, were issued as usual. To meet the demands for prompt information as to the month's weather, especially the rainfall, several other section centers were authorized to print and distribute condensed monthly summaries for their States as early as possible. Annual summaries of the 44 sections were also published in full, and form a valuable addition to the series already issued.

Considerable work has been accomplished in the preparation of data for a bulletin on the winds of the United States, which it is hoped to complete before the end of the coming year.

During the year there has been a further increase in the number of requests for data, embracing all features of climate and coming from all portions of the United States as well as from many foreign countries. These requests were all promptly complied with as far as possible.

COOPERATIVE METEOROLOGICAL STATIONS.

Cooperative stations to the number of about 4,200 are now in successful operation, covering nearly every important locality in the United States and furnishing data by which to establish accurately the essential features of the climate of the districts represented. Now that the country is fairly well covered with these stations, it has been the policy not to extend the cooperative work save in a few important newly settled districts. Requests are being constantly received, however, asking for new stations and claiming that the local interests demand their establishment.

SPECIAL SERVICES.

The corn and wheat, cotton, and sugar and rice region services were continued, with slight increase in the number of reporting stations. Reports from over 400 regular and special stations are now being used in these services. In the corn and wheat region 12 central points issue daily a total of more than 1,000 bulletins, while 26 stations in the cotton belt issue more than 1,500 bulletins. These services are rapidly becoming more popular, as evidenced by the increasing circulation of the bulletins and the many and persistent demands that have been made for the extension of the cotton and corn and wheat services westward into the more newly settled territory.

The policy of combining under a single observer the work done for the bureau at points where two observers had heretofore been employed has been continued. Thirty-four such combinations were accomplished during the year, resulting in some saving in pay to observers, a decrease in telegraph tolls, and less work in the preparation and auditing of accounts.

INSTRUMENT DIVISION.

The routine work of the Instrument Division, comprising the issue and maintenance of the standard instrumental equipment at all stations, has been maintained in a thorough manner throughout the year.

SPECIAL INSTRUMENTAL EQUIPMENTS.

Early in July, 1911, the officials of the city of New York requested the Weather Bureau to take over and operate the Central Park Meteorological Observatory, founded and for many years maintained by Dr. Daniel Draper. This was promptly done, and, in order to carry on proper comparisons between the Draper instruments and the standard types used by the Weather Bureau, a complete equipment of the latter was installed in August. Comparative records will be maintained for a year or more for the purpose of making as complete connection as possible between the old records and those that will be obtained in future.

Shielded rain and snow gauges were installed for comparative observations at stations in the Denver section, under Mr. Brandenburg; at Yellowstone Park, under Mr. Gittings; and in the Utah section, under Mr. Thiessen. These officials have reported generally satisfactory results, together with suggestions for structural modifications to overcome difficulties experienced. In all cases the records of snowfall from these gauges are 20 per cent to 25 per cent greater than obtained by the customary means. It seems advisable, therefore, to extend the installation of these gauges as means and opportunity permit, having due regard to the suitability of the location and exposure and the probable permanence of the station.

Upon the request of the Chief of the Bureau of Animal Industry, Prof. Marvin, of the Weather Bureau, was detailed to recommend and specify a complete equipment for the protection from lightning of the buildings and structures at the Morgan Horse Farm, Middlebury, Vt. The work of installation was carried out by the farm workmen, and an effective system of protection provided at a small part of the ordinary cost of such work.

In furtherance of the active cooperation of the Weather Bureau with other departments of the Government, instruments have been installed at Priest River, Idaho, and Cloquet, Minn., for the Forest Service, and equipments have also been sent to the forest experiment stations at Ephraim, Utah, and Quincy, Cal., where they will soon be installed. In cooperation with the Bureau of Mines, instruments have been supplied and provisions made for collecting humidity and temperature data over central Illinois, to be used in the study of causes and prevention of mine disasters.

In connection with the extensive arrangements made during the year to observe and study the conditions attending frosts in orchards, equipments were placed at 39 points of observation at 10 different orchard stations in North Carolina. Less extensive provisions were made for similar observations at Grand Junction, Colo., Provo, Utah, and a few stations in Oregon. Plans in hand for a general extension of studies in other important fruit sections will call for additional equipments.

Kiosks were purchased for 10 stations, and these are now in full operation, except at three stations where the work of erection is almost completed.

INSTRUMENTS FOR SPECIAL RESEARCH WORK.

The development of special apparatus for the measurement of solar radiation was extended during the year and equipments of the Marvin pyrheliometer were completed for use at Washington, Mount Weather, Madison, Lincoln, and Santa Fe, as earlier mentioned.

It has been known for a number of years that the velocities of the wind, as shown by the standard types of anemometers, are increasingly erroneous at velocities of 50 to 60 miles per hour and higher. As the exact evaluation of these indications can be determined only by comparatively elaborate investigations, Prof. Marvin was directed to take up this important problem. In accordance with his recommendations, two methods of investigation will be conducted. Preparations are already well advanced for making these tests by means of an anemometer whirling machine. This apparatus consists of a horizontal arm 30 feet in length, which revolves about a vertical axis and carries at its outer end the anemometer to be tested. Tests of a satisfactory nature can be obtained by this means at different velocities up to 70 or 80 miles per hour. The second method of testing will be carried out in a so-called wind tunnel. A large blower, or fan, will drive the air through a closed channel or duct producing conditions under which the velocity of the anemometers subjected to the current thus created can be measured accurately by well-known dynamic principles, as well as by the aid of special types of pressure gauges. General plans for the equipment required are now in the hands of blower companies, with a view to further development along lines of greatest efficiency and economy of power. With this apparatus the velocities will be carried beyond 100 miles per hour.

LIBRARY.

The additions to the library during the year numbered 1,204 books and separate pamphlets, bringing the total collection up to about 32,000. All additions were catalogued under author and subject. The cataloguing of the meteorological contents of scientific journals was carried on as usual.

The urgent need of more space for this branch of the office was met at the end of the fiscal year by the acquisition of two more rooms and the installation therein of modern steel shelving. There is thus provided a long-desired opportunity to relocate the books throughout the library; also to set aside space for a small reading room and a workroom. When the changes now in progress are complete, the Weather Bureau library will for the first time be installed in a manner corresponding to its importance as the principal collection of meteorological literature in this country.

Noteworthy books added during the year fall into two classes, viz, (1) old books, obtained chiefly in connection with sales of large private libraries abroad; and (2) important publications of the current fiscal year.

Under (1) should be mentioned the extremely rare first edition of Wells's "Essay on Dew" (1814); the first edition of Howard's "Climate of London" (2 vols., 1818–1820); the first and second editions of Daniell's "Meteorological Essays and Observations" (1823 and 1827); Bravais's "Mémoire sur les halos" (1847); Dove's "Verbreitung der Wärme" (1852); and Foucher's "Traité des hygromètres" (1686).

Under (2) the following may be noted, not only as important additions to the library, but as, on the whole, the most noteworthy publications in the field of meteorology that have appeared throughout the world in the course of the fiscal year:

"Meteorology," by W. I. Milham (New York, 1912), aims at comprehensive scope and adaptability to classroom purposes. A. Wegener's "Thermodynamik der Atmosphäre" (Leipzig, 1911) contains many novel features, reflecting especially the recent discoveries and hypotheses of aerology; it is planned as the first of a series of books in which the author proposes to cover the whole field of atmospheric physics. "Dynamic Meteorology and Hydrography," volume 2, by V. Bjerknes and others (Washington, 1911), deals with kinematics, applying the elaborate mathematical methods of the first volume. "The Sun," by C. G. Abbot, director of the Astrophysical Observatory of the Smithsonian Institution, devotes much attention to the solar relations of the earth's atmosphere, and may be regarded as a successor to Young's well-known work bearing the same title. "Forecasting Weather," by W. N. Shaw, director of the British meteorological office, summarizes the progress, during the past decade, of English meteorology in the subject treated; it is virtually a continuation and revision with much enlarged scope of the classical work by Abercromby on this subject. A second edition, in German, of the International Meteorological Codex was published by the Royal Prussian Meteorological Institute (Berlin, 1911).

Aerology and aeronautical meteorology are increasingly prominent in recent literature. A second and final volume of F. Linke's "Aeronautische Meteorologie" (Frankfurt a. M., 1911), has appeared, and a companion work by the same writer on aeronautical climatology is promised. A. Zahm's "Aerial Navigation" (New York, 1911) devotes adequate attention to aeronautical meteorology. Other works in this field include J. S. Dines's "Second Report on Wind Structure," published by the British Advisory Committee on Aeronautics (London, 1911); P. Ludewig's "Die Messung vertikaler Luftströmungen" (Leipzig, 1911); and G. Jonas's "Methode und Tabellen für die Berechnung von Pilotballonaufstiegen" (Leipzig, 1911). However, the bulk of the recent literature on aerology, aeronautical meteorology, aerotechnics, and allied topics has appeared in the form of magazine articles, which can not be enumerated here.

The subject of agricultural meteorology is attracting much attention. The International Institute of Agriculture has issued an elaborate report on the organization of work in this field in various countries (Rome, 1911). A large series of publications have been issued by the meteorological bureau attached to the Russian Ministry of Agriculture. P. Klein's "Météorologie agricole" (Paris, 1911) is chiefly devoted to the general subject of meteorology, rather than its applications to agriculture. Phenology has made much more progress in Germany than elsewhere. A notable contribution to this subject was E. Ihne's "Phaenologische Karte des Frühlingseinzugs im Grossherzogtum Hessen," second edition (Darmstadt, 1911). In the United States the greatest share of attention has been given to the subject of frost and frost protection. This bureau published a bulletin on "Frost Data of the United States and Length of the Crop Season," by P. C. Day (Washington, 1911), and one on "Forecasting Frost in the North Pacific States," by E. A. Beals (Washington, 1912). Numerous bulletins on orchard heating were issued by the experiment stations, and this subject occupied a prominent place in the horticultural journals.

A work by C. Dorno, "Studie über Licht und Luft des Hochgebirges" (Braunschweig, 1911), is an example of elaborate modern methods of studying the radiation from the sun and sky and the normal electrical phenomena of the atmosphere as components of climate. In his "Characteristics of Existing Glaciers" (New York, 1911), W. H. Hobbs urges the importance of the polar continental ice caps as affecting the general circulation of the atmosphere. Hellmann and Elsner's "Meteorologische Untersuchungen über die Sommerhochwasser der Oder" (Berlin, 1911) is an exhaustive study on the relation of floods in the basin of the River Oder to barometric conditions. This bureau published a bulletin on "Stream Flow of the Ohio River at Cincinnati and Precipitation in the Watershed above Cincinnati," by J. W. Smith (Washington, 1912). Of more general application was D. W. Mead's memoir on "The Flow of Streams and the Factors that Modify It" (Madison, Wis., 1911).

Photographs of typical cloud forms appear in J. Loisel's "Atlas photographique des nuages" (Paris, 1911) and A. McAdie's "The Clouds and Fogs of San Francisco" (San Francisco, 1911).

The most remarkable addition to the literature of atmospheric optics was F. Busch & C. Jensen's "Tatsachen und Theorien der atmosphärischen Polarisation" (Hamburg, 1911), a monumental work on the subject treated. A useful and much-needed descriptive work on all the known forms of solar and lunar halos was published serially by L. Besson in "L'Astronomie" and subsequently reprinted in separate form, viz, "Les différentes formes de halo et leur observation" (Paris, 1911).

The psychological effects of weather and climate are discussed at length in W. Hellpach's "Die geopsychischen Erscheinungen" (Leipzig, 1911).

That meteorology is being widely introduced into the curricula of German schools is indicated by the fact that a work on the teaching of this science, "Der wetterkundliche Unterricht," by F. Linke & J. Clöossner (Frankfurt a. M., 1912), went through three editions during the year.

The following climatological and climatographical publications may be noted: L. C. W. Bonacina, "Climatic Control" (London, 1911); F. Eredia, "Il clima di Roma" (Rome, 1911) and "Climatologia di Tripoli e Bengasi" (Rome, 1912); E. Grohmann, "Das Klima im Königreich Sachsen (Dresden, 1911); M. Hall, "The Rainfall of Jamaica" (Kingston, 1911); H. E. Hamberg, "Les pluies en Suède" (Upsala, 1911); A. Knox, "The Climate of the Continent of Africa" (London, 1911); and O. Rubel, "Das Klima von Baden-Baden" (Strassburg, 1911).

Arrangements were made during the year with the Library of Congress to take over "second copies" of copyright deposits in certain cases, in accordance with a general scheme recently inaugurated for the transfer of such material to Government libraries. However, very little of the available material has thus far been found to be of value to this bureau.

The policy noted last year of strengthening the libraries at Weather Bureau stations has been continued. A new undertaking in this connection was an arrangement made to supply the stations with the current files of important meteorological journals. A system of routes has been worked out, so that the Quarterly Journal of the Royal Meteorological Society is now seen regularly at all stations of the bureau and permanently deposited at the more important stations. Similarly, the Meteorologische Zeitschrift is now routed regularly to a number of stations where it can be used to advantage.

EXAMINATIONS FOR PROMOTION.

The total number of examination papers received and rated during the year was 352, as compared with 295 during the preceding year. Following is the record in detail:

Subject.	1911		1912		Total.	Passed.	Failed.
	August.	November.	February.	May.			
English grammar	11	16	13	18	58	39	19
Arithmetic	9	10	11	19	49	39	10
Elementary meteorology	7	16	10	16	49	42	7
Essay writing	11	11	9	14	45	30	15
Algebra	7	10	13	12	42	32	10
Physics	8	6	6	7	27	27	0
Trigonometry	9	6	6	11	32	29	3
Astronomy	3	3	3	6	15	14	1
Plant physiology	3	5	2	6	16	15	1
Advanced meteorology	1	5	5	8	19	17	2
Total	69	88	78	117	352	284	68

TELEGRAPH DIVISION.

Besides performing the routine daily telegraph work at the central office of the Weather Bureau, this division audits all accounts of the bureau for telegraph and telephone service, amounting to more than a quarter of a million dollars annually. The services performed by the various telegraph and telephone companies in collecting and distributing weather reports, forecasts, and warnings have been satisfactory throughout the year.

Except for temporary interruptions, the several sections of the Weather Bureau telegraph and telephone lines were in continuous operation during the year. The cable of the Block Island-Narragansett section, extending from Block Island to Narragansett Pier, was broken about 4 miles from shore by the anchor of a passing schooner during a 60-mile gale on December 29, 1911. Repair work was begun on January 18, 1912, and two days later communication was restored between Block Island and the mainland. The total cost of repairs was $1,302.35.

Communication was interrupted at intervals on the Norfolk-Hatteras lines, but only one special observation was missed on account of line trouble. Since the substitution of cross arms for brackets at various points along this line its working condition has been materially strengthened and less line trouble has been experienced than heretofore. A new two-conductor cable was laid across New Inlet, N. C., October 8, 1911, replacing the worn-out and defective cable. Splice work on the Manteo cable during the year cleared it of long-standing trouble.

The Life-Saving Service has rendered valuable assistance in making minor and temporary repairs to the Weather Bureau line during the year.

The public receives marked benefit from the Weather Bureau line in this section through the transmission of meteorological observations, storm warnings, and vessel reports, as well as commercial messages. During the aviation meet at Kill Devil Hill in October nearly 50,000 words of press matter were sent over the seacoast line from Manteo to the various newspapers of the country.

The submarine cable from Key West to Sand Key, Fla., has worked satisfactorily throughout the year.

The operations of the Alpena, Thunder Bay, and Middle Island, Mich., section have been satisfactory, and no general repairs have been made during the year. These lines are of inestimable value to maritime interests through the display of warnings that is secured on Middle and Thunder Bay Islands, the most important points for that purpose on Lake Huron, and the benefits given by the Weather Bureau through their maintenance are appreciated by the vessel interests.

The seacoast telephone line between Point Reyes and San Francisco is in need of considerable repair. Funds have been authorized for the most urgent repairs, and the line will be placed in good condition during the coming year.

The line of the Port Crescent-Tatoosh section continues to be of great benefit to the shipping and fishing interests on Puget Sound. Our shipping reports are watched closely in Seattle, Tacoma, Port Townsend, and San Francisco, to which points are furnished three daily reports of weather and shipping and special reports of inbound shipping. Special reports of weather and of shipping bound for British Columbia ports are also furnished to Victoria, British Columbia. The opening of new salmon industries at Neah Bay, where about 2,000 fishermen, manning 350 or 400 fishing launches, make their headquarters during the salmon season, has largely increased the commercial business handled over this line.

The total line receipts collected during the year at stations on the seacoast telegraph lines were $2,998.49, which amount has been deposited in the Treasury of the United States.

PUBLICATIONS DIVISION.

This division has kept the stations fully supplied with the necessary blank forms, maps, and forecast cards, and continued the preparation and distribution of the Monthly Weather Review, the Bulletin of the Mount Weather Observatory, the National Weather Bulletin, the Snow and Ice Bulletin, the Washington edition of the daily weather map, and the Meteorological Charts of the Oceans.

There were published during the year 500 copies of Bulletin No. 39, "A Course in Meteorology and Physical Geography"; 2,500 copies of Bulletin No. 40, "The Relation Between the Precipitation Over the Watershed of the Ohio River Above and the Stream-Flow at Cincinnati"; and 2,500 copies of Bulletin No. 41, "Forecasting Frost in the North Pacific States." Also, there were reprinted 2,000 copies of Bulletin V, "Frost Data in the United States."

Binding was well advanced, including reviews and maps to date, and about 1,280 volumes nearly equally divided between the library and the Climatological Division, in both of which there had been large accumulations. The lithographic work was increased somewhat, chiefly by a larger issue of the Meteorological Charts of the Oceans and additional matter published therein.

DIVISION OF SUPPLIES.

In addition to its routine duties this division is charged with the purchase and inspection of all supplies for the central office and stations, including the preparation of specifications for articles not obtainable under the General Supply Committee's contracts.

Ten additional stations were equipped during the year with new stereotyping outfits for commercial map castings, making a total of 60 new outfits in actual use at the present time. This number does not include stations that were equipped with the old-style outfits prior to 1910 or stations where the commercial maps are produced by other processes.

With the assistance of the drafting room a new pattern for the outlines of the large glass maps was prepared in this division. This has added materially to their accuracy and general appearance. Detailed specifications for the construction and color scheme of these maps were also prepared, printed copies of which, together with blue prints of the new map pattern, have been supplied to such manufacturers as were invited to bid on furnishing and installing the maps. Through competition thus secured among art-glass manufacturers the average cost of glass maps has been reduced from about $350 to less than $200. Seven new glass maps were installed during the year—one each at Chicago, San Antonio, Seattle, New Orleans, Tampa, Evansville, and Fort Wayne.

OBSERVATORY BUILDINGS.

The new observatory building at Sand Key, Fla., which was completed early in December, 1911, is constructed of concrete, and has a foundation of concrete piles driven into the solid rock. It was designed and constructed to withstand the hurricanes that occasionally visit that region, the building that previously occupied the site having been destroyed by one of these storms.

The observatory building at Key West, Fla., which is to replace the one that was so badly damaged by the hurricane of October 11, 1910, as to make a new structure necessary, is well under way and will probably be ready for occupancy by December 1. This building has a massive concrete foundation and a superstructure of terra-cotta tiles and concrete and is designed to withstand the action of wind and waves that accompany the hurricanes of that region.

The following table shows where the buildings owned by the Weather Bureau are located, the fiscal year in which they were erected, and the cost of the building and ground in each case:

Buildings owned by the Weather Bureau.

Location.	Erected.	Cost of ground.	Cost of buildings.	Total cost.
Abilene, Tex	1909	$2,000.00	$12,841.81	$14,841.81
Amarillo, Tex	1903	1,255.00	6,503.00	7,758.00
Anniston, Ala	1907	1,799.75	12,920.69	14,720.44
Atlantic City, N. J	1902	(1)	5,991.00	5,991.00
Bentonville, Ark	1906	500.00	5,119.90	5,619.90
Birmingham, Ala	1907	[2] 61.50	15,630.36	15,691.86
Bismarck, N. Dak	[3] 1899	(1)	10,085.99	10,085.99
Block Island, R. I	1904	1,034.50	7,668.25	8,702.75
Burlington, Vt	1906	[2] 20.00	10,043.50	10,063.50
Canton, N. Y	1909	[2] 1.35	14,135.20	14,136.55
Cape Henry, Va	1902	(1)	9,222.45	9,222.45
Charles City, Iowa	1907	3,036.75	9,338.47	12,375.22
Columbia, S. C	1905	3,799.00	9,165.00	12,964.00
Devils Lake, N. Dak	1904	2,209.05	7,431.50	9,640.55
Dodge City, Kans	1909	2,050.00	10,837.62	12,887.62
Duluth, Minn	1904	2,041.70	7,430.68	9,472.38
East Lansing, Mich	1909	[2] 11.35	12,781.04	12,792.39
Hatteras, N. C	1902	[1] [4] 217.00	4,889.75	5,106.75
Havre, Mont	1904	1,795.00	5,087.08	6,882.08
Iola, Kans	1907	2,241.25	9,730.94	11,972.19
Jupiter, Fla	1902	(1)	6,346.90	6,346.90
Key West, Fla	1903	2,020.00	[5] 14,844.50	16,864.50
Kittyhawk, N. C	[3] 1902	(1)	1,616.00	1,616.00
La Crosse, Wis	1907	3,523.50	12,276.24	15,799.74
Modena, Utah	1903	(1)	4,346.00	4,346.00
Mount Weather, Va.:				
Administration building	1909	1,863.15	48,035.26	49,898.41
Machine shop and balloon shed	1904	650.00	8,167.00	8,817.00
Central heating and power plant	1909	(1)	11,964.74	11,964.74
Absolute building	[6] 1906	(1)	7,000.00	7,000.00
Variation building	[6] 1906	(1)	8,904.55	8,904.55
Stable	1903	(1)	1,900.00	1,900.00
Barn	1905	(1)	900.00	900.00
Cottage for workmen	[3] 1905	(1)	1,300.00	1,300.00
Physical laboratory	[7] 1909	(1)	37,521.51	37,521.51
Cottage and office	[8] 1909	(1)	11,246.34	11,246.34
Nantucket, Mass	1905	(9)	4,728.53	4,728.53
Narragansett Pier, R. I	1904	4,151.75	8,036.50	12,188.25

[1] Government reservation.
[2] Donated; figures represent cost of title transfer.
[3] Remodeled.
[4] Additional ground purchased.
[5] Estimated cost of new building now in course of construction.
[6] Begun in 1905.
[7] Begun in 1903.
[8] Begun in 1907.
[9] Building and ground purchased as a whole.

Buildings owned by the Weather Bureau—Continued.

Location.	Erected.	Cost of ground.	Cost of buildings.	Total cost.
Northfield, Vt.	1909	[1] $101.00	$12,795.64	$12,896.64
North Head, Wash.	1902	(2)	3,820.13	3,820.13
North Platte, Nebr.	1906	(3)	3,818.50	3,818.50
Oklahoma, Okla.	1906	[1] 38.90	10,520.25	10,559.15
Peoria, Ill.	1905	[1] 54.00	7,875.50	7,929.50
Point Reyes Light, Cal.	1902	(2)	2,875.00	2,875.00
Port Crescent, Wash.	1902	102.00	730.94	832.94
Richmond, Va.	1909	[1] 8.75	15,489.01	15,497.76
St. Joseph, Mo.	1909	5,040.95	16,882.80	21,923.75
Sand Key, Fla.	1903	(2)	14,991.39	14,991.39
Sault Ste. Marie, Mich.	1899	(2)	2,994.12	2,994.12
Sheridan, Wyo.	1907	2,021.75	12,089.30	14,111.05
Southeast Farallon, Cal.	1903	(2)	5,211.22	5,211.22
Springfield, Ill.	1906	(2)	10,236.50	10,236.50
Tatoosh Island, Wash.	1902	(2)	5,000.00	5,000.00
Washington, D. C.	....	(3)	174,950.76	174,950.76
Yellowstone Park, Wyo.	1904	(2)	11,156.00	11,156.00
Yuma, Ariz.	[4] 1903	(2)	1,500.00	1,500.00
Total.	....	43,648.95	688,825.39	732,574.34

[1] Donated; figures represent cost of title transfer.
[2] Government reservation.
[3] Building and ground purchased as a whole.
[4] Remodeled.

Buildings rented by the Weather Bureau for living and observatory purposes.

Station.	Annual rent.	Other items included.
Alpena, Mich.	$650	Heat, light, water.
Cape May, N. J.	400	Water.
Clallam Bay, Wash.	120	Do.
Del Rio, Tex.	444	Heat, light, water.
Durango, Colo.	318	Water.
Honolulu, Hawaii.	1,020	Six rooms; heat, cleaner, light, janitor and porter service, electric current for fan, storage.
Independence, Cal.	456	Water for domestic and irrigation purposes, and the trimming and care of all trees on the premises.
Kalispell, Mont.	360	
Lewiston, Idaho.	540	
Manteo, N. C.	144	
Moorhead, Minn.	420	Seven rooms; heat, light, water.
Mount Tamalpais, Cal.	420	Heat, light, water, and the free transportation of Government employees and supplies.
Pysht, Wash.	144	Water.
Roseburg, Oreg.	550	Heat, light, water.
Roswell, N. Mex.	720	Heat, light, cleaner.
San Juan, P. R.	300	Five rooms.
Thomasville, Ga.	420	
Tonopah, Nev.	840	
Twin, Wash.	132	Water, and water-pipe system in building.
Winnemucca, Nev.	480	Heat, light, water.
Total.	8,878	

PERSONNEL OF THE BUREAU.

The numerical strength of the Weather Bureau at the close of the year was 9,992, as compared with 9,483 at the end of the preceding twelve months. Of the total number, 7,830, or more than 78 per cent, are cooperative observers who serve without compensation other than that received through the free distribution of Government publications. There were 440 more of this class of employees than at the close of the preceding year, due to the extension of the service in various ways, the greatest increase being in the number of cooperative marine meteorological observers.

The total number of commissioned employees at the end of the year, 808, was 32 more than at the close of the preceding year. The central office force was increased by 11, much needed additional assistance having been provided for by an increase in the number of statutory positions in the appropriation bill for 1911–12. The field force was increased by 21 because of extensions of the service, mainly in the West and Southwest. The transfer of new assistant observers from the central office to Mount Weather, Va., for instruction nominally increased the force at the latter station. It was found possible to reduce the working force of five stations by one employee each, allowing a corresponding strengthening of the personnel at five other stations where the demands on the service had greatly increased.

The number of permanent appointments in the classified service, including transfers and reinstatements, was 122, or 46 more than during the preceding year. The temporary appointments numbered 58, or 31 more than in the previous year.

Mention was made in the last annual report of the difficulty experienced in retaining new assistant observers because of the low entrance salary ($720 per annum) and the temptation presented to young men possessing the requisite education and qualifications to engage in other employment giving more lucrative immediate returns. New assistant observers are now given promotion to $840 per annum after six months' satisfactory service. This has had the effect of materially reducing the number of resignations of that class of employees, and should enable the bureau to secure a better grade of men.

There were 276 promotions in the classified service during the year. All but one, which was a restoration to a position formerly held, were to the next higher grade or by civil service certification for advancement from subclerical positions. The considerable increase of the number of promotions as compared with the previous year was due partly to enlarged appropriations, which made possible the advancement of deserving employees, and partly to the transfer of many positions from the miscellaneous to the statutory roll on July 1, 1911, which required the immediate advancement of other employees following a vacancy in a higher grade.

In the classified service there were 59 voluntary resignations, 11 less than during the previous year. There were 5 forced resignations and 4 removals from the classified service, compared with 9 and 12, respectively, during the previous year.

Of the 114 probationary appointees, only 1 failed to complete successfully the six months' probationary period.

There were 9 reductions in the classified service: 7 for causes in no way reflecting upon the character or ability of the employees, and 2 because of physical disability.

In the unclassified service there were 2 permanent and 4 temporary appointments, 5 promotions, 1 reduction, and 1 resignation.

The absence record for the year shows that station employees took a little more sick leave than during the preceding year, while central office employees took a little less. With respect to annual leave, the amount taken by station employees was practically the same as last year; at the central office, the male employees had an average of 3.9 days more and the female employees an average of 0.7 of a day less. For the entire service, the amount of sick leave was the same as during the previous year, and the average annual leave was 0.8 of a day more.

There were five deaths in the commissioned force during the year.

CHANGES IN THE FORCE OF THE BUREAU.

CLASSIFIED SERVICE.

Appointments:

Probationary—	
Printer, at $1,000	1
Clerks, at $900	2
Copyists, at $840	2
Skilled artisans, at $840	4
Assistant observers, at $720	29
Copyists, at $720	3
Repairmen, at $720	3
Firemen, at $720	2
Messenger boy, at $480	1
Messenger boys, at $450	7
Skilled laborers, at $450	4
Messenger boys, at $360	56
	114
Permanent—	
Station agents, at $300	3
Student assistant, at $300	1
	4
By transfer—	
Clerk, at $1,200	1
Copyist, at $840	1
	2
By reinstatement—	
Messenger, at $600	1
Messenger boy, at $360	1
	2
Temporary—	
Compositors, at $1,250	2
Printers, at $1,000	2
Clerk, at $900	1
Repairmen, at $720	4
Messenger boy, at $480	1
Skilled laborer, at $450	1
Messenger boys, at $360	46
Student assistant, at $300	1
	58

Promotions (all promotions except 1 were to the next higher grade or by certification for advancement from subclerical positions)	276

Reductions:

Causes—	
To grant assignment to preferred station	4
As an offset to the bureau for allowance of quarters, fuel, and lights	1
To conform to provisions of appropriation bill	2
Physical disability	2
	9

Resignations:	
Voluntary	59
Required because of—	
Unsatisfactory service	1
Unsuited for Weather Bureau service	2
Disobedience of instructions	1
Physical disability	1
	64
Transferred to other bureaus of the Department of Agriculture	4
Removals:	
Causes—	
Neglect of duty	1
Absence without authority	1
Falsification of records and harsh treatment of subordinates	1
Insubordination	1
	4
Services terminated (student assistants)	2
Dropped from the rolls at termination of probationary period because of unsatisfactory service	1
Deaths	4

UNCLASSIFIED SERVICE.

Appointments:	
Permanent—	
Unskilled laborer, at $720	1
Charwoman, at $240	1
	2
Temporary—	
Unskilled laborers, at $450	4
Promotions (all to the next higher grade)	5
Reduction:	
Cause—	
Not competent to perform duties of higher grade	1
Resignation (voluntary)	1
Death	1

ABSENCE.

Average number of days per employee during calendar year 1911.

	Sickness.	Annual leave.
Station (99 per cent males)	1.9	6.9
Washington, D. C.:		
Males	3.5	27.3
Females	9.2	26.6
Entire service	2.4	12.0

STATISTICS OF THE SERVICE.

The following tables show the numerical strength of the bureau, and the highest, lowest, and average salaries paid in the commissioned grades:

Numerical strength of the Weather Bureau, June 30, 1912.

At Washington, D. C.:		
Classified	184	
Unclassified	12	
		196

Outside of Washington, D. C.:		
Classified	607	
Unclassified	5	
		612
Total commissioned employees		808
Additional employees outside of Washington, D. C.:		
Storm-warning displaymen	186	
River observers	406	
Cotton region observers	104	
Corn and wheat region observers	124	
Rainfall observers	81	
Sugar and rice region observers	7	
Special meteorological observers	66	
Special cranberry-marsh observers	8	
Special snow and ice observers	4	
Mountain snowfall observers	271	
Marine meteorological observers	30	
Cotton region and river observers	27	
Corn and wheat region and river observers	9	
Sugar and rice region and river observers	2	
Cotton region and rainfall observers	19	
Corn and wheat region and rainfall observers	7	
Cotton region and special meteorological observer	1	
Special meteorological and river observer	1	
Corn and wheat region and mountain snowfall observer	1	
Total noncommissioned employees		1,354
Total paid employees		[1] 2,162
Persons serving without compensation (except through the distribution of Government publications):		
Cooperative observers and correspondents (omitting 388 paid observers enumerated elsewhere)	5,119	
Cooperative storm-warning displaymen	105	
Cooperative river observers	16	
Cooperative rainfall observers	12	
Cooperative mountain snowfall observer	1	
Cooperative special meteorological observers	24	
Cooperative special cranberry-marsh observer	1	
Cooperative marine meteorological observers	2,552	
Total cooperatives		7,830
Total numerical strength		9,992

Distribution of the commissioned force, June 30, 1912.

In Washington, D. C.:	
Accounts Division	[2] 15
Climatological Division	17
Executive branch	18
Forecasting	1
Instrument Division	11
Library	5
Division of Observations and Reports	27
Observatory	1
Publications Division	25
River and Flood Division	3
Supplies Division	[2] 11
Telegraph Division	12
Verification section	2

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[1] This total embraces all paid persons connected with the bureau on June 30, 1912, except 13 commissioned employees absent on that date and who had been granted leaves of absence or furlough without pay for one month or more.

[2] One employee devotes a portion of his time at one of the map stations at the United States Capitol.

In Washington, D. C.—Continued.

Drafting room (under direction of the chief clerk)	4
Heat, light, and power plant (under direction of the chief clerk)	7
Miscellaneous mechanical work (under direction of the chief clerk)	7
Watch force (under direction of the chief clerk)	5
General messenger and laborer service (under direction of the chief clerk)	25
Total	196

Outside of Washington, D. C.:

53 stations with 1 commissioned employee	53
42 stations with 2 commissioned employees	84
52 stations with 3 commissioned employees	156
17 stations with 4 commissioned employees	68
17 stations with 5 commissioned employees	85
6 stations with 6 commissioned employees	36
4 stations with 7 commissioned employees	28
3 stations with 8 commissioned employees	24
1 station with 9 commissioned employees	9
3 stations with 10 commissioned employees	30
1 station with 14 commissioned employees	14
1 station with 25 commissioned employees	25
200 stations	[1] 612

In addition to the foregoing there are eight special observing (one man) stations in the West Indies, mainly in operation during the hurricane season, and a special repair station in Washington operated from October to April, inclusive.

The following salary table omits persons on duty at special observing and substations where the salaries are $25 a month or less, and where, as a rule, the tour of duty covers but a small fraction of the day and only certain seasons of the year:

Salaries paid in the commissioned grades.

	June 30, 1912.	
	Stations.	Washington, D. C.
Classified grades:		
Highest salary	$3,500	$6,000
Lowest salary	300	450
Average salary	1,047	1,193
Unclassified grades:		
Highest salary	720	720
Lowest salary	480	240
Average salary	552	540

Average salary of all (station and Washington) is $1,070.

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[1] This represents the normal station force. On June 30, 1912, there were actually on duty 612 employees.

REPORT OF THE CHIEF OF THE BUREAU OF ANIMAL INDUSTRY.

U. S. Department of Agriculture,
Bureau of Animal Industry,
Washington, D. C., November 19, 1912.

Sir: I have the honor to transmit herewith a report of the operations of the Bureau of Animal Industry for the fiscal year ended June 30, 1912.

Respectfully,
A. D. Melvin,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

ORGANIZATION AND ADMINISTRATION.

The work of the Bureau of Animal Industry during the fiscal year ended June 30, 1912, has been of the same general character as in recent years. While fostering and promoting the live-stock industry in its various aspects, the highest mission of the bureau is to aid the people of the country in obtaining a plentiful and wholesome supply of food of animal origin, such as meat, dairy products, and eggs.

The organization remained as heretofore throughout the year. Effective July 1, 1912, however, the Inspection Division, owing to the growing volume and the varied nature of its work, was divided into two new divisions, to be known as the Meat Inspection Division and the Field Inspection Division, with Drs. R. P. Steddom and R. A. Ramsay as the respective chiefs. Dr. Steddom was previously chief and Dr. Ramsay associate chief of the Inspection Division. The work of the Meat Inspection Division is sufficiently indicated by its name. The work of the new Field Inspection Division consists in the suppression and eradication of contagious diseases of live stock and the inspection of animals and the supervision of their movement in interstate commerce.

The number of employees in the service of the bureau at the beginning of the fiscal year (July 1, 1911) was 3,284. During the year there were 638 resignations and terminations, including 28 dismissals for cause. The accessions by appointment, reinstatement, and transfer numbered 665. The force on July 1, 1912, numbered 3,311, of whom 2,410 were engaged in the work of meat inspection.

Owing to the rapid increase of the work of the bureau, the funds from which promotions are ordinarily made are consumed in providing for this extension of the work. It is only natural that employees entering the service under the impression that they are to receive promotion after satisfactory service should become dissatisfied and disgruntled at not being advanced in salary after a reasonable time. In order to attract and hold capable men, as well as to reward efficient service, I consider it desirable that some definite schedule of promotions should be arranged for the different classes of employees, and that funds should be provided by Congress according to these schedules so that those who are giving their best efforts to the service may expect and realize promotions within a reasonable time.

THE MEAT INSPECTION.

The meat inspection constitutes the largest branch of the bureau's work. Inspection was carried on during the year at 940 establishments in 259 cities and towns. There were inspected at the time of slaughter 59,014,019 animals, as compared with 52,976,948 in the preceding fiscal year. The increase was mostly in hogs. There was a slight decrease in cattle, and a considerable proportion of these animals were thin and light in weight because of drought in a part of the Northwest. There were condemned on post-mortem examination 203,778 entire carcasses and 463,859 parts of carcasses, making a total of 667,637 carcasses condemned wholly or in part. In addition, there were condemned on reinspection 18,096,587 pounds of meat and meat food products that had become spoiled or otherwise unfit for food since original inspection. More detailed statistics and information regarding the year's work appear in the portions of this report dealing with the work of the Inspection and Biochemic Divisions.

The growth of the inspection has reached the limit of the standing annual appropriation of $3,000,000, and further extension will depend upon an increase in the amount available for this work. In the estimates for appropriations for the fiscal year 1914 an increase of $300,000 has been requested.

Census figures recently made available make it possible to compare the slaughter under Federal inspection with the total slaughter of animals for food in the United States in 1909, the year covered by the census returns. Taking the census figures for the total slaughter, and the bureau's statistics of the slaughter under Federal inspection during the fiscal year 1909, and converting the number of animals into pounds of dressed meat, it is calculated that 58.12 per cent of all the meat slaughtered in the country in that year was Federally inspected. With the extension of the inspection in the last three years it is likely that the proportion slaughtered under Federal inspection now reaches about 60 per cent. Of the 40 per cent not under Federal inspection, nearly half represents the farm slaughter and the remainder consists mostly of the slaughter by local butchers.

IMPROVEMENT IN RECENT YEARS.

The meat-inspection law of 1906 has now been in effect for six years. During the early part of this period the service was extended to a large number of establishments not previously under inspection, and it was necessary to devote our energies toward remedying the more insanitary conditions. As time has gone by the older buildings have been for the most part replaced by buildings of the best modern sanitary construction, making possible great improvement in cleanliness and sanitation, until it can be justly claimed that the sanitary condition of slaughtering and packing establishments under Federal inspection is now beyond serious criticism.

In recent years we have been able to give more attention to improving details of the inspection service and bringing about a more uniform system based on definite standards. Seven traveling inspectors are constantly engaged in visiting the various stations, observing and reporting on the work as it is carried on, correcting irregularities, and endeavoring to promote uniform efficiency. No effort is spared to give our people a service that will protect them against diseased and unwholesome meat products, first by adopting standards of inspection that are sound and safe, and then by carrying on the inspection faithfully and efficiently in accordance with those standards.

The operations of our inspection service have many times been observed and investigated in recent years by authorities and experts not only in this country, but from various parts of the world, and such people regard it as very efficient. Several eminent foreign scientific men who were delegates to the recent International Congress of Hygiene and Demography at Washington took occasion to visit the packing houses at Chicago and elsewhere, and, so far as I have heard, all without exception expressed themselves in terms of high commendation of our inspection service. The opinions of such experts vastly outweigh the criticisms of those who are not specially qualified to pass judgment on the technical questions involved in meat inspection.

There is occasionally some misunderstanding regarding the passing for food of meat from animals slightly affected with certain diseases, such as tuberculosis. The scientific standards followed by the bureau in determining when to pass and when to condemn meat in such cases represent the practically unanimous views of the world's experts in pathology and other branches of science having a bearing on the subject. These authorities agree that, although an animal may be affected with a disease in a certain form, a portion of the meat may be absolutely sound, healthful, wholesome, and fit for human food. It should be thoroughly understood that we do not pass diseased meat; we only pass under certain circumstances the sound and wholesome meat of a slightly diseased animal after removing and condemning the affected portion, usually merely glands or an organ. And in drawing the line we take the safe side for the protection of the consumer, as is shown by the report of a commission hereinafter quoted. Our regulations and practices in this respect are fully as strict as those of any other nation, and we condemn meat that in some other countries would be passed for food.

A few years ago our regulations on this point were submitted to a commission of scientists outside the department, namely: Dr. William H. Welch (chairman), professor of pathology, Johns Hopkins University; Dr. L. Hektoen, professor of pathology, University of Chicago; Dr. Joseph Hughes, president of the Chicago Veterinary College; Dr. V. A. Moore, professor of comparative pathology, Cornell University; Dr. Leonard Pearson, dean of the veterinary department, University of Pennsylvania; Dr. M. J. Rosenau, director of the Hygienic Laboratory, United States Public Health and Marine-

Hospital Service; and Dr. Charles Wardell Stiles (secretary), chief of the Division of Zoology, Hygienic Laboratory, United States Public Health and Marine-Hospital Service. This commission reported that:

> In general the regulation in question fully safeguards the public health in so far as the points contained in regulation 15 are concerned. If there be any general error in the regulation, this is in favor of the public rather than in favor of the butchers and packers. Most of the paragraphs of regulation 15 are indorsed without comment. Several sections (for instance, the sections on hog cholera, swine plague, actinomycosis, tuberculosis, and tapeworm cysts) could be made less stringent without any danger to the health of the consumer.

The changes made in the regulations with regard to the disposal of animals and carcasses affected with disease and other conditions, since the passage of the law of 1906, are summarized as follows:

(1) No change has been made in the methods of disposing of carcasses affected with anthrax, blackleg, emaciation and anemia, erythemia, hemorrhagic septicemia, icterus, mange, melanosis, parasitic ictero-hematuria, pseudo-leukemia, pyemia, rabies, ringworm, septicemia, Texas fever, traumatic pericarditis, and urticaria.

(2) The present regulations, including all amendments and instructions, are more rigid with regard to these diseases and conditions: Actinomycosis (lumpy jaw), enteritis, hog cholera and swine plague, malignant epizootic catarrh, mammitis, measles cysts (exclusive of beef measles), meningitis, metritis, peritonitis, phlebitis, pleurisy, pneumonia, polyarthritis, uremia and sexual odor, dead and dying animals, and organs or parts of carcasses which are badly bruised or which are affected by tumors, abscesses, suppurating sores, or liver flukes. Furthermore, in the 1906 regulations sections were added providing for the condemnation of animals affected with lockjaw or tetanus and those carelessly scalded. In 1908 additional regulations were made to cover the disposition of carcasses affected with vaccinia, milk fever, railroad sickness, gid parasites in sheep, hydatid cysts, and intestines showing nodular formations, and providing further for the segregation of diseased carcasses. Since 1908 amendments have been issued regarding necrobacillosis and sheep measles, in accordance with new discoveries in animal pathology.

(3) The only diseases and conditions regarding which the regulations (including all amendments and instructions) have been made less stringent are tuberculosis, beef measles, pregnancy and parturition, and the minimum age limit for young animals. The modifications regarding tuberculosis were made in pursuance of the recommendations of the expert commission above mentioned, and the changes affecting all of the last-named group were made in accordance with the latest scientific knowledge and with the prevailing opinions of the leading authorities on the subjects.

The regulations have therefore been made more stringent in many particulars, while in only four out of a long list of diseases and conditions have there been modifications which might be regarded as less rigorous, and in these four items the regulations are still on the safe side for the protection of the consumer and are abundantly justified by the best authorities. On the whole the standards of inspection have been steadily raised in recent years.

In practice and technique the inspection has likewise been improved. This is especially true of the lymph-gland inspection, which is recognized by all authorities on meat inspection as the fundamental principle, in fact the keystone, of an efficient meat-inspection service. The improvement in sanitation has already been mentioned. The proportion of condemnations since 1906 is about 50 per cent higher than for a similar period before that year.

Some comment has been made on the bureau's practice of marking meats as inspected and passed when the animals were slightly affected with disease which, in the opinion of experts, did not affect the wholesomeness of the meat. The suggestion has been offered that such meat, instead of being given the usual mark "U. S. inspected and passed," should be marked in a special way to show that although it is believed by the inspector to be wholesome it comes from an animal not entirely free from disease. Only two ways of marking meat are provided by the law, one for meat that is inspected and passed and the other for meat that is inspected and condemned. No provision is made for any qualifying mark to be placed upon meat that is inspected and passed, and it seems that before any such plan could be adopted it would be necessary for Congress to amend the law.

AMENDMENTS TO THE LAW RECOMMENDED.

The meat-inspection law of 1906 has brought about great improvement in requiring the correct labeling of meat products, but this feature of the law is not entirely satisfactory. Trade labels on packages of meat products, besides showing the true name of the product, the inspection legend, and establishment number (with manufacturer's name if desired), as at present, should in addition be required to show the principal ingredients in the case of mixed products.

It would also be desirable for the department to have more authority over the class of places that are granted exemption by the present law. The law exempts from inspection farmers and retail butchers and dealers, but provides that the Secretary of Agriculture may require inspection even in these instances when he thinks it desirable. As the amount of meat shipped by such persons in interstate trade is relatively small, the compelling of inspection does not seem to be justified in view of the expense that would be involved. It would seem better if these persons were permitted to ship their meats in interstate trade only after having received a certificate of exemption from the Secretary and after an inspection of their premises has shown them to be in a sanitary condition. This is in effect being done now, but the authority for doing it is not clear.

MICROSCOPIC INSPECTION OF PORK FOR TRICHINÆ.

During the past session of Congress a special message was sent to that body by the President recommending the appropriation of additional funds for the purpose of conducting a microscopic inspection for trichinæ of such pork as is usually prepared to be eaten without cooking. This action was brought about through the death of several persons after having eaten uncooked ham which had been prepared in a manner similar to that used in preparing certain varieties of corned ham. While this class of meat has been cured, and in some instances smoked, the curing is insufficient to destroy the trichina parasites which may infest the meat. For several years the bureau has undertaken to point out through the daily press, medical journals, and other publications, especially those printed in foreign languages, the danger of eating uncooked pork. It would seem, however, that these warnings have reached but a small proportion of the people, since cases of trichinosis continue to be reported. While the microscopic inspection of pork for trichinæ will not absolutely detect all infected meat, it would probably detect the majority of infected cases, and in that way would greatly reduce the danger of infection. It seems necessary, therefore, that even if all pork is not to be microscopically inspected, that which is intended to be eaten without cooking should be so inspected. To inspect microscopically the entire number of hogs which are now slaughtered at establishments having Government inspection would require an additional appropriation of at least $4,000,000. By inspecting only those hogs from which pork products are to be prepared which are intended to be eaten without cooking, a much smaller amount of money would be required. The regular meat inspection does not now include the microscopic inspection of pork for trichinæ.

THE BEEF SHORTAGE.

The situation regarding our beef supply has been a fruitful cause for alarm in recent years. During the present year it reached an acute stage, as indicated by the fact that the highest prices ever known were paid for cattle at our stock centers this past summer. We no longer have the former abundant supplies of cattle raised cheaply on the free range. The range is being cut up and fenced off into farms or diverted to sheep grazing. In addition there is the great increase in the price of corn and other feeds, which has made cattle feeding a risky and expensive undertaking, especially as for a considerable time the prices received were unsatisfactory from the feeder's standpoint. For these various reasons cattle raising went into disfavor, and the present greatly restricted supply is the result.

The home demand for beef, on the other hand, has been increasing along with the population. According to the census we have 29,000,000 more people to feed than we had 20 years ago. Americans are great meat eaters. A recent estimate made in this bureau shows the annual consumption of meat per head of the population to be 162 pounds, of which beef constitutes 80 pounds and veal 7½ pounds. This is about 25 pounds per head greater than the British consumption of beef and veal and approximately 40 pounds greater than that of France and Germany.

It is inevitable, therefore, that our beef should have become scarce and the prices high and that our former large export trade should have dwindled to almost nothing. It is a simple business proposition that when the home market demands practically our entire output, at prices equal to or better than the foreign, there will be little or no exporting. Some incorrect statements have appeared to the effect that American beef is sold cheaper in England than it is here. A comparison of market quotations shows that there is no material difference in the prices of the same quality of beef here and in England. It is true that large quantities of cheap beef are imported into England, but it is not United States beef. This meat is from South America and Australia; it is mostly frozen and is of very different grade from that exported from this country.

Some idea of the growing scarcity of beef cattle may be had from the following table, which gives the number of milch cows and of "other cattle" in the United States on January 1 of each year for the past 10 years, as estimated by the Bureau of Statistics, Department of Agriculture:

Jan. 1—	Milch cows.		Other cattle.	
	Number.	Increase (+) or decrease (−).	Number.	Increase (+) or decrease (−).
		Per cent.		*Per cent.*
1903	17,105,000		44,659,000	
1904	17,420,000	+ 1.84	43,629,000	− 2.31
1905	17,572,000	+ .87	43,669,000	+ .09
1906	19,794,000	+12.64	47,068,000	+ 7.78
1907	20,968,000	+ 5.93	51,566,000	+ 9.56
1908	21,194,000	+ 1.08	50,073,000	− 2.90
1909	21,720,000	+ 2.47	49,379,000	− 1.39
1910	21,801,000	+ .37	47,279,000	− 4.25
1911	20,823,000	− 4.49	39,679,000	−16.07
1912	20,699,000	− .60	37,260,000	− 6.10

On comparing the first and last years of the table it may be seen there are about 3,500.000 more dairy cows in the country than there were 10 years ago, whereas beef cattle during the same period have decreased 7,500,000. Taking the last six years of the period, we find that dairy cows have been practically stationary, while beef cattle have diminished by 14,306,000, or 27.74 per cent.

The time has come when we must conserve our meat supply and take steps to increase it, and at the present remunerative prices for food animals it is probable that this will be gradually accomplished. Farmers generally, and especially those in the corn belt, should take advantage of the situation to develop cattle feeding under the present favorable conditions. The South has great possibilities for the future in this respect. The mild climate, the long grazing season, and the cheap land in this section make it highly suited for the purpose of beef production. This has been proved by the cattle-feeding experiments of this bureau in cooperation with the Alabama Experiment Station. There is, however, one drawback—the presence of the cattle tick. Fortunately this pest is being gradually but surely removed as a result of the energetic work of the Government and the several States involved. The development of cattle raising in the South should closely follow the extermination of the ticks.

AN EXAMPLE OF THE BENEFITS OF MILK IMPROVEMENT.

A remarkable instance of the value of a wholesome milk supply in promoting health is afforded by the experience of the past two years at the United States Naval Academy, at Annapolis, Md.

A few years ago, at the request of Paymaster Samuel Bryan, United States Navy, who was and is charged with the provisioning of the Naval Academy, the bureau tested with tuberculin some of the dairy herds from which milk was being obtained under contract. The discovery of tuberculosis in some of the herds, together with other bad sanitary conditions, led Paymaster Bryan to undertake the establishment of a dairy herd for the academy. By his request the bureau selected the animals for such a herd early in the past fiscal year, and has continued to give assistance and supervision in the management of the herd. Since October 1, 1911, this herd has been supplying milk to the academy. For the first two months of this period it was necessary to continue a portion of the contract supply, but since then the entire supply has been furnished by the academy herd.

Paymaster Bryan has compiled figures showing the health of the midshipmen for one year before and one year since the installation of the academy herd. Taking into account only illness of a digestive or intestinal character, and counting each day that a midshipman was sick or excused on this account, it is found that during the year from October 1, 1910, to September 30, 1911, with milk from outside sources, the "sick days" numbered 1,598, or an average of 133 a month; while for the following year, with milk from the academy herd, there were only 296 "sick days," averaging less than 25 a month. For more than two months (including September and October, 1912) there has not been a single case of illness of the character mentioned. The number of midshipmen at the academy was practically the same each year, ranging from about 750 for the greater part of the year to about 250 during the summer.

The great decrease in illness from digestive disturbances is attributed entirely to the better quality of milk, as other dietary conditions have remained unchanged.

A chart showing graphically the figures above given was exhibited by the bureau at the recent International Congress of Hygiene and Demography in Washington, and at other gatherings, and attracted much attention from hygienists.

REDUCING THE LOSSES FROM BAD EGGS.

A few years ago a study of the losses from the spoiling of eggs because of bad methods of producing and handling showed that these losses probably amounted to $45,000,000 annually, and that one-third of this loss was caused by the formation of "blood rings" in the eggs, due to the development of the germ by heat. As this loss from blood rings is directly preventable on the farm, the bureau has been endeavoring to bring to the notice of farmers and poultry raisers the means by which this can be done. The remedy is to produce infertile eggs; that is, eggs from hens that are not allowed to run with male birds. Such eggs will not hatch and blood rings will not develop in them. Early in the past fiscal year Bulletin 141, The Improvement of the Farm Egg, was issued, and a bulletin on The Care of the Farm Egg is in press. A very striking poster, arranged by Mr. Harry M. Lamon, of the Animal Husbandry Division, has also been issued. It shows pictures of fertile and infertile eggs after incubation from one to seven days, the former showing blood rings and chick development, while the latter are apparently unchanged from the perfectly fresh condition.

As another means of improving the quality of eggs and preventing losses the bureau is advocating the "loss-off" or quality basis of buying by merchants. Cooperative work to establish this method has been carried on in some of the leading egg-producing States.

With the general adoption of better methods of producing, marketing, and handling eggs, it is easily possible to reduce greatly the losses and to bring about great improvement in the quality of eggs on the market, to the common benefit of farmers, dealers, and consumers.

THE STUDY AND ERADICATION OF ANIMAL DISEASES.

The scientific investigation of animal diseases and the administrative work of eradicating certain contagious diseases have been continued with good results. The particulars of these lines of work appear in the following pages under the headings of the various divisions.

During the fiscal year an area of 22,827 square miles was added to the territory that has been released from quarantine after having been freed from the southern cattle ticks that spread Texas fever, and since the close of the fiscal year 5,066 additional square miles have been released, bringing the total territory freed of ticks and released from quarantine since this work was undertaken in 1906 up to 167,714 square miles. This area is greater than the combined size of Georgia, Alabama, and Mississippi, and amounts to nearly one-fourth of the total infected territory at the time the work was begun.

Progress was also made in the eradication of scabies of sheep and cattle. Twenty-one counties and parts of five counties in Kentucky, comprising about 9,177 square miles, were released from the sheep-scabies quarantine.

Malta fever has been found to exist among goats and people in certain sections of Texas and New Mexico. A comprehensive inquiry into the extent of this infection is to be made in the near future, and it is hoped that some method can be devised for preventing the spread of the disease and bringing about its eradication. As this disease is a serious one in man, it should be eradicated as promptly as possible.

Among the most important scientific work of the year has been that relating to contagious abortion of cows. The losses caused by this trouble are probably heavier than has been realized. The bureau investigators have discovered that the germs causing this disease frequently occur in milk and are sometimes also found in the tonsils of children, presumably having been conveyed there in milk. The germs cause distinct lesions when inoculated into guinea pigs. Just what bearing this organism may have on human health is not yet known, but in the present state of our knowledge it seems that we have an additional reason for advocating the pasteurization of milk. Our studies are being devoted to the further elucidation of the disease and the working out of methods of prevention.

The complement-fixation test has been found increasingly useful in the diagnosis of certain diseases. Its use has been developed and extended by the bureau's investigations. This test has now been successfully employed in the diagnosis of glanders, dourine, Malta fever, infectious abortion, and hemorrhagic septicemia. Because of its accuracy and the promptness with which it can be executed, this test is a great advance over methods formerly available.

Foot-and-mouth disease is one of the principal infections against which we have to guard in protecting the live stock of this country from the introduction of diseases from abroad. This disease has long prevailed on the Continent of Europe. Although Great Britain is separated from the Continent by water, still foot-and-mouth disease gains access there occasionally in spite of the vigilance of the authorities. A series of outbreaks there for more than a year has caused us to withhold permission for the importation of stock from that country. The British authorities have so far been unable to determine the means of the introduction of the contagion. A commission appointed to study this question has suggested, among other things, the carrying of the disease by birds. Buzzards have long been known as carriers of disease, and no doubt many outbreaks of anthrax and hog cholera in the United States, especially in the South, are due to those and other birds.

In the early part of 1912 a veterinary inspector (Dr. Cooper Curtice) was sent by the bureau to Santo Domingo to ascertain whether or not cattle-fever ticks exist there, as it was desired to import cattle from that country into the United States. The tick was found to be present, so importations can not be permitted under the law. A report by Dr. Curtice on live-stock conditions in Santo Domingo is being prepared for publication.

THE IMPORTANCE OF STATE LIVE-STOCK SANITARY FORCES.

The eradication of diseases of live stock is a subject that concerns both Federal and State Governments, and is very properly a matter of joint action, as it has been made in much of the work so far done. While it is the purpose of the bureau to continue its cooperative efforts for the eradication of diseases of animals in any of the States and to guard against the spread of contagion from one State to another, it is highly important that each State should provide a completely organized live-stock sanitary force, invested with adequate legal powers, equipped with laboratory facilities, and provided with sufficient funds to meet any ordinary outbreak of disease. Many of the States whose agricultural assets are largely in the form of live stock have scarcely any such organization, and the funds provided are sometimes not more than enough to pay the salaries and traveling expenses of its several officers, there being no provision whatever for funds for the eradication of an outbreak of disease that may occur at any time. A fully equipped service as above suggested would be a valuable asset to any State; it would operate as an effective insurance against live-stock losses and would be a direct means of increasing the value of stock farms in the State.

THE ESTABLISHMENT OF PUREBRED HERDS FREE OF TUBERCULOSIS.

It seems very desirable that the department should undertake to encourage and assist the raisers of purebred cattle in establishing herds that are absolutely free of tuberculosis and to which the department can certify as such. This, in my opinion, would greatly stimulate the eradication of the disease and at the same time to a great extent prevent the constant spread of the disease and its introduction into many clean herds through the purchase of purebred stock.

NEEDED LEGISLATION.

Further legislation by Congress is still needed in order to enable the department to exercise efficient control over certain matters relating to the live-stock industry and for the public good. Reference has already been made to the desirability of certain amendments to the meat-inspection law. Some of the following recommendations have been made in previous reports.

QUARANTINE AND TRANSPORTATION OF LIVE STOCK.

Under recent decisions of the courts the act of Congress of March 3, 1905, entitled "An act to enable the Secretary of Agriculture to establish and maintain quarantine districts, to permit and regulate the movement of cattle and other live stock therefrom, and for other purposes," does not give the department power to control shipments of live stock in the course of interstate transportation by rail after such shipments have been moved from quarantined States and have been received by connecting carriers in States which are not quarantined. It is important, in order to prevent the spread of contagious disease, that the department should have power to continue its control over such shipments of live stock from quarantined States until the animals have reached their destination and have been safely disposed of. The Solicitor of the department has suggested that the act be amended by the addition of the following clause, which has been inserted in the estimates for appropriations for the coming fiscal year:

Provided, That hereafter all the provisions of the said act approved March third, nineteen hundred and five, shall apply to any railroad company or other common carrier whose road or line forms any part of a route over which cattle or live stock transported in the course of shipment from any quarantined State or Territory or the District of Columbia, or from the quarantined portion of any State or Territory or the District of Columbia into any other State or Territory or the District of Columbia.

Experience in the enforcement of what is known as the 28-hour law has shown the desirability of exempting in some cases from its operation live stock which is being shipped under quarantine restrictions. Owing to unforeseen delays it is sometimes necessary in order to comply with the law to unload stock which is being shipped under quarantine restrictions into pens which are not specially set apart for that class of stock and which are likely to be used soon afterwards for other stock, and in this way infection has sometimes been spread. This danger could be practically obviated if the Secretary of Agriculture were clothed with power in such cases of emergency to waive the provisions of the law so that animals under quarantine might be kept in the cars for a sufficient time to reach a point where facilities were available for handling them without danger to other stock.

Although existing law authorizes the Secretary of Agriculture to require the disinfection of live-stock cars moving into or out of a section that is quarantined, it is desirable to have this authority extended so as to empower the Secretary of Agriculture to require the disinfection of any live-stock cars used in interstate commerce whenever he may consider such disinfection necessary in order to prevent the spread of disease.

In the shipment of live stock it is sometimes a practice to put into the same car animals of various sizes and different species, with the result that small animals are often injured or trampled to death by larger ones. In order to remedy this evil, it is desirable that the Secretary of Agriculture should have authority to regulate the shipment of different classes of stock in the same cars.

Dead animals are sometimes shipped in the same cars with live ones, and there is danger of the spread of disease in this way. Such shipments should be prohibited by law.

There should also be legislation prohibiting the interstate shipment of young calves, which, on account of their inability to eat solid food and their refusal to drink water, are sometimes kept for several days without nourishment.

REGULATION OF VACCINES, ANTITOXINS, ETC.

With the growing use in veterinary practice of vaccines, serums, antitoxins, tuberculins, and other preparations for the detection, prevention, or treatment of diseases of animals and the increasing imports of such products there is constant danger that contagious diseases may be introduced from abroad and cause great damage, as happened a few years ago in the outbreaks of foot-and-mouth disease. Furthermore, some of these preparations, including both domestic and imported products, as found on the market, have been shown by the bureau's investigations to be lacking in potency and therefore worthless, or not properly standardized, or even contaminated or harmful. Such preparations are not only a fraud but a menace. Biological remedies when properly prepared are very useful in veterinary medicine, and their field is constantly widening, but there is need for official supervision and control. It therefore seems very desirable that the Secretary of Agriculture should be given legal authority to control the importation of such products and to supervise the preparation of those manufactured in this country for interstate commerce, such authority to be similar to that already vested in the United States Public Health Service with regard to similar products for use in human medicine.

SALE OF PATHOLOGICAL AND BIOLOGICAL SPECIMENS.

It is recommended that authority of law be given to the Department of Agriculture to sell at cost such pathological and biological specimens as the Secretary of Agriculture may deem of scientific or educational value to scientists or others engaged in the work of hygiene and sanitation, all moneys so received to be deposited in the Treasury of the United States.

INSPECTION OF DAIRY PRODUCTS.

In previous reports attention has been called to the need of inspecting dairy products, especially cream and butter, and supervising their shipment. Even without inspection many creameries maintain a good standard of sanitation and produce high-grade, wholesome butter, but this can not be said of creameries in general. Cream is frequently shipped great distances to creameries to be made into butter and is often received in such a filthy and putrid state as to be thoroughly unfit to enter into the composition of a food product. Investigations have shown that 61 per cent out of 1,554 lots of cream received at creameries and buying stations was of third grade—that is, dirty, decomposed, or very sour; that 94.5 per cent of 715 creameries investigated were insanitary to a greater or less degree; and that 72.6 per cent of these creameries did not pasteurize the milk so as to destroy any disease germs that might be present. As disease-producing germs are known to survive for long periods in butter made from unpasteurized cream, and as butter is eaten in the raw state, this product when made under such conditions as prevail in the majority of creameries can not be said to be wholesome and free from danger to human health. It is believed that a proper law, well enforced, would remove nearly all of the bad conditions now existing. A Federal law would, of course, apply only to products made for interstate or export shipment or to establishments engaged in interstate or foreign commerce. Such a law should embody the following requirements:

(1) That a proper standard of sanitation in the plants be maintained.

(2) Compulsory pasteurization of all cream.

(3) The power should be given to inspect the cream received at such establishments and to supervise the processes of manufacture, as well as to inspect the finished product and to condemn and destroy for food purposes any milk, cream, or butter found to be unwholesome or unfit for human food.

(4) Low-grade cream which is neutralized, blown, or otherwise renovated should be required to be handled in a separate plant and the butter made from such cream labeled so as to indicate that it is made from renovated cream; in other words, it should be handled in the same manner as renovated butter.

(5) The stamp of approval of the United States Government should be required upon all cases before any transportation company is allowed to accept them for interstate or export shipment.

(6) The interstate shipment for food purposes of cream or other dairy products that are unwholesome or unfit for human food should be prohibited.

Some of these provisions could be modeled after the present meat-inspection law. Such a law would, of course, require an adequate appropriation for the expense of carrying out its provisions.

Even though Congress may not be ready to establish a comprehensive system of inspection, much good could be accomplished by a law regulating the interstate shipment of cream and other dairy products so as to prevent interstate traffic in unwholesome products.

The law of May 9, 1902, under which the inspection of renovated or process butter and of factories engaged in the preparation of this product is carried on, is inadequate and should be amended or superseded by a law containing provisions similar to those of the meat-inspection law, so far as they may be applicable, but retaining the revenue feature of the present law. Some improvement has been made possible by a provision inserted in the current agricultural appropriation act, giving authority for enforcing sanitation at these establishments, but further legislation is needed. The new law should embody the following provisions:

(1) The name of the product should be "renovated butter." This name would indicate exactly what the product is. The name "process butter," allowed by the present law, is deceptive.

(2) The manufacturer should be required to pack all renovated butter in small packages, of say, 1, 2, and 3 pounds, and should be required to place a stamp upon each package in such manner as to seal the package, which stamp should not be broken or removed except by the consumer of the goods. A definition in the law covering the word "consumer" would, of course, be necessary. At present a very large percentage of renovated butter is sold as butter; and while properly prepared renovated butter is a wholesome product, it should be sold to the consumer for exactly what it is. The manufacturer's original package would be a great factor in preventing deception.

(3) The Secretary of Agriculture should have authority to make regulations regarding the sanitation of the plants, the kind of packing stock to be used, and the finished product. There should also be authority to make sufficient inspections to see that these regulations are complied with.

(4) The Secretary of Agriculture or his authorized agents should have authority to condemn and destroy for food purposes all packing stock which is for any reason unfit to be used in a food product. He should also have authority to require the pasteurization of all milk, cream, and butter oil to be used in renovated butter.

(5) All manufacturers' packages and shipping cases of renovated butter should be labeled "Renovated butter" in letters of a given size, and in addition the label should bear the words "U. S. requirements complied with," or some other statement of approval, and the establishment number. All labels, marks, and brands should be approved by the Secretary of Agriculture under suitable regulations issued by him.

(6) All railroad and transportation companies should be prohibited from accepting for interstate shipment any renovated butter not properly labeled.

(7) The Secretary of Agriculture should have authority to withdraw inspection and prohibit the further use of the approval label by plants failing to comply with the law and the regulations.

(8) Suitable penalties should be provided for all violations.

It seems an anomaly that oleomargarin should be prepared under Government inspection, thus protecting the consumer against unwholesomeness and allowing the producer whatever commercial advantage there may be in inspection, while no such benefits are afforded in the case of butter. From the standpoint of the consumer there is just as much need for inspection of one as of the other, quite apart from any question as to the merits of the two products. Each is a wholesome and legitimate article of food when properly prepared and when sold for exactly what it is. It is unfair, however, that butter producers should have to meet the dishonest competition of oleomargarin and renovated butter masquerading as creamery or dairy butter. And even though the consumer may not be injured in health by the deception when other products are sold to him as butter, he is nevertheless the victim of an economic fraud and a fraud against ethics. Aside from any features of inspection, in framing legislation for regulating oleomargarin or other butter substitutes or renovated butter every effort should be made to guard effectively against the fraudulent sales of these products as butter.

PUBLICATIONS AND DIFFUSION OF INFORMATION.

The bureau endeavors to serve the people by furnishing information on the various subjects with which it deals. This is done through publications, correspondence, public addresses, and material furnished to teachers, writers, and the press.

The bureau's publications issued during the fiscal year numbered 89, aggregating 3,773 printed pages. This is an increase of approximately 20 per cent over the pages issued during the preceding fiscal year. The new publications consisted of the Twenty-seventh Annual Report of the Bureau (for 1910), revised editions of the special reports on Diseases of the Horse and Diseases of Cattle, the Annual Report of the Chief of the Bureau for the fiscal year 1911, 14 bulletins, 22 circulars, 5 Farmers' Bulletins, 2 reprints from the annual report, 19 orders and amendments, and 26 miscellaneous publications. Besides the new publications there have been numerous reprints of earlier publications.

The large volume of requests for information makes it necessary to conduct a heavy correspondence in addition to the distribution of literature.

THE ANIMAL HUSBANDRY DIVISION.

The Animal Husbandry Division, of which Mr. George M. Rommel is chief, deals mainly with the breeding and feeding of live stock and poultry.

HORSE BREEDING.

COLORADO WORK.

The carriage-horse breeding work in cooperation with the Colorado Experiment Station is progressing very nicely, the 1912 crop of foals being an unusually fine lot of youngsters. Of the 24 mares bred at the station during the season of 1911, 14 foals were dropped, 11 of which are alive and thrifty. Of the 3 foals lost 1 died at birth, 1 died at the age of 10 days from distemper, and 1 was fatally injured in the pasture. The crop of foals is smaller than usual, but the average excellence is above that of previous years.

The ranks of the stud were badly depleted during the past year by a very serious epidemic of distemper, which seemed to attack the young animals in its most virulent form. The disease spread through the entire stud, in spite of everything that could be done to check it, and resulted in the loss of 9 animals, as follows: One 3-year-old stallion, two 2-year-old fillies, four yearling colts, one yearling filly, and one foal.

The board of survey met on January 16, 1912, and condemned 14 animals, 3 of which were the property of the Department of Agriculture and 11 the property of the experiment station. Of these 11 have been sold at public auction, 2 died of distemper, and 1 remains to be sold.

The following statement shows the animals in the stud on June 30, 1912:

Ages.	Stallions.	Mares.	Total.
Aged	3	29	32
4-year-olds	1	3	4
3-year-olds	3	4	7
2-year-olds	6	4	10
Yearlings	8	5	13
Weanlings	1	10	11
Total	22	55	77

IOWA WORK.

The gray draft horse breeding work in cooperation with the Iowa Experiment Station is still in progress. Of the 8 mares bred in 1911, 4 have produced living foals, all of which are doing well. Two of the foals are cross-bred Shire-Cyldesdale, one sired by Dapple Tom and out of Gray Pearl, the other, foaled July 5, 1912, sired by Marmion and out of Rosebush. The other two foals are cross-bred Clydesdale-Shire, both sired by Kuroki, one being out of Wrydelands Starlight and the other out of Kirby Bedon Firefly.

At the present time the breeding stud consists of the following horses, all gray in color: Two Shire stallions, 5 Shire mares, 1 Clydesdale stallion, and 4 Clydesdale mares.

Since the breeding work has been in operation 14 foals have been dropped and have lived to sufficient age to determine their color. The breeding and colors are as follows: Clydesdale-Shire crosses—7 grays, 3 bays; total, 10. Shire-Clydesdale crosses—3 grays, 1 probably gray (foaled July 12, 1912); total, 4.

Eleven of the progeny are living and are doing well. The breeding and color of these colts are as follows: Clydesdale-Shire crosses—4 grays, 3 bays; Shire-Clydesdale crosses—3 grays, 1 probably gray (foaled July 5, 1912).

Three of the Clydesdale mares have been bred to foal in 1913 and one filly was in foal when purchased. All of the Shire mares have been bred to Scot's Grey, the Clydesdale colt recently purchased to take the place of Kuroki, the original Clydesdale stallion.

VERMONT WORK.

During the fiscal year the stud at the Morgan Horse Farm, at Middlebury, Vt., was increased by the purchase of the following stock, secured at Meade, Kans.: One 8-year-old mare, by Julian Morgan (4448); one yearling stallion, by Headlight Morgan (4683); two 2-year-old fillies, by Headlight Morgan (4683).

The board of survey condemned 4 brood mares in 1911, which were sold at public auction on November 21, 1911. At the same time 4 condemned weanlings were sold by the Vermont Experiment Station.

The following statement shows the number of horses on the Morgan Horse Farm on June 30, 1912:

Age.	Stallions.	Mares.	Geldings.	Total.
Aged	[1] 2	21	[2] 4	27
4-year-olds	1	1	----------	2
3-year-olds	2	6	----------	8
2-year-olds	4	6	1	11
Yearlings	2	3	1	6
Weanlings	8	7	----------	15
Total	19	44	6	69

[1] One stallion leased to Massachusetts Agricultural College.

[2] Work horses.

During the winter the use of silage as a feed for brood mares was tried out with very satisfactory results. The mares were left out during the entire winter, being brought in just before foaling time in the spring. An open shed afforded protection in stormy weather. Their daily ration consisted simply of 20 pounds of silage and 10 pounds of hay. The mares came through the winter in better condition than those of a check lot wintered under similar conditions but with a grain ration, and their foals when dropped were all straight and sound.

During the breeding season of 1912 the provisions of the Army horse-breeding plan were made available to mare owners in Vermont to breed to stallions at the Morgan Horse Farm. Fairly good results have been obtained thus far, although the plan has not been given the publicity which it needs to acquaint farmers with it.

ARMY HORSE BREEDING.

Of the 51 mares registered by the bureau in Virginia, in the experiment to test the plan of the Government to encourage the breeding of horses for the United States Army, 27 were bred to Henry of Navarre and 11 to Octagon; 13 were not bred. Of the 27 mares bred to Henry of Navarre 13 have foaled, 4 foals being colts and 9 fillies; 14 mares missed. Of the 11 mares bred to Octagon 4 are reported as having colt foals, 6 missed, and 1 died shortly after having been bred. As indicated in my last report, the main feature of this experiment is a success; farmers are willing to breed mares to remount stallions on the terms proposed by the Government.

SHEEP AND GOAT INVESTIGATIONS.

The range sheep-breeding work in Wyoming progressed very satisfactorily during the year. Although the year 1912 was rather an exceptional one in Wyoming for running sheep, the loss in our flock was very light. The ewes lambed exceptionally well, and the wool clip was the best obtained since the experiment was inaugurated. The average weight of fleece for the entire flock was 12.5 pounds. This average is not as good as that for 1911, but the wool was much cleaner and the average stated includes the entire flock without any culling. Progress has been made in the experiment, and the yearling ewes from the 1911 lamb crop will make an excellent addition to the breeding flock the coming year. With the addition of the breeding pens constructed during the year, the present facilities for handling the experiment are especially good.

The Southdown flock at the Morgan Horse Farm has done well during the year. A good lamb crop was secured, and the wool clip was the best secured since the flock was founded. The entire flock, including the ewes and rams, averaged 7 pounds a head, which is especially good for this breed. The undesirable ram lambs were castrated.

The sheep work at the experiment farm at Beltsville, Md., during the year consisted in the breeding of American Merinos and Barbados, the cross-breeding of the Barbados-Merinos and Southdowns, and the cross-breeding of the ewes of the American Merino, Barbados, Cotswold, and Cheviot breeds with the Karakule. Fifty-seven skins of the Karakule crosses were tanned and dyed. The inventory of sheep on June 30, 1912, showed 6 rams, 5 wethers, 113 ewes, and 47 lambs.

The goat-breeding work consisted in the breeding of the short-haired common goats and the crossing of a Saanen buck on a number of the common white does, with a view to obtaining a strain of milking goats. An exceptionally good kid crop was obtained. None of the does were milked during the year, as there were no facilities for carrying on this work. The inventory of goats on June 30, 1912, showed 5 bucks, 45 does, and 35 kids.

CATTLE BREEDING.

HOLSTEIN CATTLE.

The work carried on during the past year in cooperation with the North Dakota Experiment Station in the breeding circuit near New Salem was along the same general lines as the work of last year. Records have been kept of the production of all the cows in the herds of the members. The records made by the cows for the calendar year 1911 were not as large as the records made during the previous year, because of the shortage of feed production, due to the drought that prevailed over North Dakota during the season of 1910 and 1911. There was a shortage of both winter and summer feed during the year.

Six heifers were put into the Advanced Registry during the past year. The best record was made by the heifer Dakota of Elmwood (139155, H. F. H. B.), age 1 year 11 months 27 days, producing in the 7-day test 292.1 pounds of milk, 12.031 pounds of fat; average test, 4.12 per cent.

No outstanding sires have been discovered in the herds up to date, but the work has not been in progress long enough to expect this, considering the number of purebreds in the circuit.

A large number of grade heifers have been sold from the circuit, and the surplus purebred bulls have been sold readily, most of them going to the farmers in the immediate vicinity of the circuit. Forty-three bulls have been sold since the work was begun.

All the members who erected silos last summer were pleased with the results obtained with them last winter. Most of them succeeded in growing sufficient corn to fill them, regardless of the drought.

MILKING SHORTHORNS.

The cooperative project which has been conducted by the University of Minnesota and the United States Department of Agriculture in breeding milking Shorthorn cattle progressed along similar lines to those of previous years. On June 30, 1912, there were four herds in the experiment. There was an increase of almost 1,000 pounds of milk per cow during the last two years. The highest yield was 8,956 pounds of milk and 402 pounds of butter fat in 365 days. A number of other cows exceeded 7,000 pounds of milk and 250 pounds of butter fat. About 60 cows were under inspection during the year. The average of these will be close to 6,000 pounds of milk and 230 pounds of butter fat, a substantial increase over the preceding year. It would seem that herd averages of 7,000 pounds of milk and 300 pounds of butter fat are possible. A few cows have done especially well, one cow giving 10,291 pounds of milk and 470 pounds of butter fat in 12 months. A cow with her second calf has a record of 8,223 pounds of milk and 286 pounds of butter fat. Other cows have increased their yields over previous years in spite of the fact that no clover hay has been fed.

The following is a summarized report of the annual average production to date, including all animals completing a full lactation period:

Year.	Number in herds.			Days in milk.	Yield of milk.	Yield of butter fat.	Per cent fat in milk.	Age when heifers calved.
	Cows.	Heifers.	Total.					
					Pounds.	*Pounds.*		*Months.*
1907-8	3	2	5	440	6,142	250	4.07	37
1908-9	5	1	6	352	5,227	208	3.98	36.5
1909-10	28	5	33	306	4,393	164	3.73	32.5
1910-11	39	6	45	328	5,312	202	3.81	33
Average of 4 years	75	14	89	328	5,012	191	3.81	33.7

The cooperation of the department in this experiment was withdrawn June 30, 1912.

ANIMAL BREEDING INVESTIGATIONS.

The inbreeding investigations with guinea pigs which have been in progress for some years were continued. Twenty-three families of guinea pigs are now being inbred. One family, No. 15, became extinct during the past year, after having been inbred for seven generations. All families have passed through five generations of litter brother and sister inbreeding. A preliminary report on this part of the work has been prepared and will soon be ready for publication. Some of the families have been inbred for 11 generations, while others have some of their members still in the sixth generation.

POULTRY INVESTIGATIONS.

The work of breeding Barred Plymouth Rocks for increased egg production, which has occupied the attention of the Maine Experiment Station in cooperation with this department for many years, is now approaching a close. During the past year the final solution of the main features of the problem of how egg production is inherited in the domestic fowl has been reached. It remains now only to work out some minor points of detail.

The egg investigations and poultry-fattening work in the State of Kansas that were started in 1910 were continued during 1911. Bulletins on the work done and results secured have been presented for publication. Considerable time has been spent, in conjunction with the Dairy Division of this bureau, in advocating in Texas and Iowa the cooperative handling of eggs through creameries. One of the bureau men spent practically all his time during the latter part of the winter and spring months assisting in the organization of the buying of eggs on a quality or "loss-off" basis in Michigan and Minnesota.

At the Beltsville experiment farm, with a breeding stock of about 60 hens, about 1,200 chicks have been hatched. Some color-breeding work has been carried on with a pen of Rhode Island Reds, and a crossing experiment with a White Plymouth Rock male on a Silver Grey Dorking female is in progress.

The organization of girls' and boys' poultry clubs in Virginia is being undertaken in cooperation with the farmers' cooperative demonstration work of the Bureau of Plant Industry.

A poultry book is being prepared that will touch on practically all the important phases of the poultry industry. It is thought that this book will be of value to poultrymen throughout the country.

ANIMAL NUTRITION INVESTIGATIONS.

The principal subject of the investigation during the fiscal year in cooperation with the Pennsylvania State College has been the effect of fine grinding upon the amount of energy which must be expended by cattle in the mastication and digestion of their food and upon the proportion of the total feed energy remaining available for maintenance or productive purposes. During 1911–12 the experiments were upon alfalfa hay as compared with the so-called "alfalfa meal" produced commercially by grinding the hay. It is expected to continue the study of digestive work in succeeding years to cover other materials and other factors besides grinding.

In addition to this main line of work, an improved form of adiabactic calorimeter has been devised, and experiments have been made upon the methods of drying urine for analysis, upon the alkali excretion of cattle, and upon the electrical measurement of the body temperature of the experimental animal. Provision has also been made for equipping the respiration calorimeter with an automatic temperature-difference recorder, which will materially facilitate the work.

The junior animal husbandman engaged in the compilation of the results of American feeding experiments has been working principally on the analyses made of foodstuffs since 1890. The card-index system is used, and up to the present time the reports of about one-half the States have been recorded. The results of digestion experiments will also be included in this compilation. When the index is completed summaries and averages will be made and the results published.

INVESTIGATIONS IN BEEF AND PORK PRODUCTION.

The work in cooperation with the Alabama Experiment Station in the study of the fundamental principles of economical beef and pork production in the South is still in progress. One bulletin was published during the year and others are in press or in process of preparation.

The production of hogs in southern States is believed to promise well, and in order to concentrate effort and provide the most favorable conditions for the investigations the hog work has been transferred to the farm of Messrs. Cobb & McMillan, near Sumterville, Ala.

An agent has been appointed to take up, in cooperation with the farmers' cooperative demonstration work of the Bureau of Plant Industry, the organization of boys' pig clubs in Alabama.

During the past two years an extensive investigation of the shrinkage of beef cattle in transit has been in progress. The work was divided into three fields—the Southwest, covering shipments to Kansas City and other points in southwestern territory; the Northwest, covering shipments to the Missouri River and Chicago; and the corn belt, covering shipments to Chicago. Data have been secured on cattle fed on grass alone, on beet pulp, on silage, and on a straight corn ration, and on cattle shipped various distances, as well as during various kinds of weather. This material is now being prepared for publication. Both shippers and railroads have shown much interest in the work.

CERTIFICATION OF PURITY OF BREEDING OF ANIMALS.

Since January 1, 1911, the department has exercised the power given to it under the provisions of paragraph 492 of the tariff act of August 5, 1909, to pass on the sufficiency of the pedigree certificates of animals imported for breeding purposes, instead of delegating this function to certified American pedigree-record societies, as had been the policy prior to that time.

From July 1, 1911, to June 30, 1912, inclusive, this bureau issued certificates of pure breeding for the following number of imported animals: Horses, 3,136; cattle, 2,024; sheep, 1,140; hogs, 63; dogs, 651; and cats, 29.

In connection with the examination of pedigree certificates the animals are inspected at the ports of entry to see that the animals agree with the data on the certificates of the foreign societies with respect to age, color, and markings. During the fiscal year certificates have been returned, either to the importers or to the secretaries of the foreign societies, for the following number of animals: Horses, 135; cattle, 52; sheep, 140; dogs, 22; and cats, 1. In some cases the importer had obtained the wrong certificates for the animals imported; in others the certificates had been altered since having been issued by the pedigree societies; while in others the errors were merely clerical ones.

THE BELTSVILLE EXPERIMENT FARM.

The transformation of the experiment farm near Beltsville, Md., from a badly run-down and much-neglected property into one on which experimental live-stock work can be conducted is still in progress. This farm is divided between the Animal Husbandry Division and the Dairy Division.

During the year work was done on the hog house, the house for the animal-breeding work was carried almost to completion, and a poultry house was erected. A commodious horse barn is nearing completion. The place has been thoroughly fenced and the land put into a systematic rotation. During the present year a silo and a sheep barn will be built and the land drained.

Provision should be made at an early date for the erection of cottages for the employees of the farm. At present most of these men live some distance from the farm, and this is not conducive to the welfare of the farm. By having the permanent employees housed on the property it will not only be better protected, but the help will be more contented and much more permanent.

THE DAIRY DIVISION.

Work relating to the dairy industry is carried on by the Dairy Division, of which Mr. B. H. Rawl is chief.

As part of the varied activities of this division a great diversity of public meetings are attended by its representatives. During the past year such meetings numbered over 650 and included national, State, and local fairs; international, national, and State conventions; farmers' institutes and short courses in dairying; local meetings of farmers and business men; creamery meetings; market milk meetings; and butter-scoring contests. Assistance was given in the organization of 14 live-stock associations. Eleven and a half weeks were spent on agricultural trains, with meetings two or three times a day. At the National Dairy Show a 12-cow demonstration was conducted for 10 days. This attracted much attention, and some of the buildings used are being copied on farms.

DAIRY FARMING INVESTIGATIONS.

The principal lines of dairy farming investigations, in charge of Mr. Helmer Rabild, are southern field work, western field work, cow-testing associations, and experimental work.

SOUTHERN FIELD WORK.

The work for the development of dairying in the South consists, as heretofore, in introducing and improving the business of dairying in new sections. This work has been carried on by 10 men in Alabama, Georgia, Kentucky, Mississippi, Maryland, North Carolina, South Carolina, and Virginia. An extra man has been put on in southern Mississippi to develop dairying, particularly in that part of the boll-weevil territory which has been freed from cattle ticks.

The interest of the farmers in this work is growing. The work is all done in cooperation with agricultural colleges (or, in some cases, State departments of agriculture), as is the case with all educational work of the division. In one State the work has been taken over entirely by the State authorities, and it is hoped that the same may later be done in other States.

In the greater portion of the South the dairymen are scattered and the work must necessarily be done for the most part with individuals rather than through institutes, associations, etc. This makes progress slower; nevertheless there is a steady and substantial growth in dairying in the Southern States. In order to make this work most effective it is distributed widely over the respective States, so as to have the object lessons brought within sight of as many farmers as possible. It is reported that 55 silos have been built by reason of the influence of those built by our field men in two Southern States. The object is to work dairying into the general system of cotton farming, rather than to replace that system. As direct results of this work, during the year 118 silos were built (71 stave silos, 39 concrete, and 8 of other types), 14 dairy houses were built and 11 remodeled, 21 barns built and 25 remodeled, 26 purebred bulls were added to herds, 4 cow-testing associations and 1 bull association were organized, and 76 dairymen kept records of their herds. Twenty-five of the stave silos cost an average of $1.90 per ton capacity, and 24 concrete silos $2.68 per ton capacity. Dairy instruction has been introduced into several schools outside of the agricultural colleges. Attendance at a variety of public meetings, including fairs, is an important part of the field work.

WESTERN FIELD WORK.

In the main the western demonstration work is conducted in the same way as the southern. Conditions in the Western States, however, are such as to make dairying develop more rapidly in communities, and because of this fact, as well as because of the great size of the Western States, the work is confined to a more restricted area in each State and not distributed over the whole State, as in the South. Up to the present time this work has been carried on in Colorado, Idaho, North Dakota, and Iowa. The results have been very beneficial, and a great many requests to take up work in new places have been received. In Twin Falls County, Idaho, the dairymen have organized to raise funds, with the assistance of the county commissioners and the State authorities, for the employment of a field man to work especially in that locality.

There is a particularly fine field for work of this character in the irrigated regions, where in places large quantities of alfalfa are produced. This alfalfa should be consumed on the farms in order to realize proper prices and also to conserve the fertility of the soil. Furthermore, in this way the dairymen can supply the demand of the surrounding country for dairy products, which to a considerable extent are now imported from the East and the Middle West.

The statements already made in regard to public meetings and cooperation with State authorities apply also to the western work. Special work in Iowa is described elsewhere.

During the year 49 silos were built in the West as a result of this work, 9 of stave construction, 38 of concrete, and 2 of other types. The interest in silo building is increasing rapidly. In Colorado, for instance, there were less than a dozen silos two years ago; to-day there are over 100. The concrete silo is very economical, particularly where lumber is expensive, and for this reason it is often recommended. The cost of construction to the farmer is greatly reduced in many cases by cooperation with our field men. One Colorado farmer had a concrete silo, 14 by 37 feet, built by contract at an expense of $368.20.

Another farmer in the same locality built a silo himself, under the supervision of one of our men, of the same material, size 16 by 37 feet, at a cost of $291.80. Eighteen concrete silos in Colorado cost an average of $2.37 per ton capacity, and two in Idaho cost $2.25 per ton capacity.

Twenty-two dairy barns were built, and 32 remodeled, under the supervision of our field men; 13 were under construction at the end of the year; and 55 are contemplated for the coming year. Twenty dairy houses were built, 11 remodeled, 8 are under construction, and 25 are contemplated for the coming year. Sixteen purebred bulls were added to herds, 2 cow-testing associations and 1 bull association were organized, and 18 dairymen kept records of their herds.

DAIRY BUILDING PLANS SUPPLIED.

Aside from the work of the field men, the Dairy Division is constantly sending from the office, to people who apply for them, plans of various kinds of dairy buildings. In many cases these plans are used in the erection of buildings under the supervision of the field men; in many other cases they are used independently and in various parts of the country. During the past fiscal year plans were furnished for 291 barns, 170 silos, 134 milk houses, 11 ice houses, and 77 miscellaneous buildings.

COW-TESTING ASSOCIATIONS.

There are now 97 active cow-testing associations in the United States out of 118 which have been organized since 1905. Of the active associations 14 are in Wisconsin; 12 in Vermont; 8 each in Iowa, Maine, Michigan, and New York; 6 in Washington; 5 each in Illinois and Minnesota; and smaller numbers in various other States. During the year the States of Vermont, New York, Michigan, Illinois, and Iowa provided for men to look after the cow-testing association work in those States. Wisconsin has engaged an additional man for this work, making two men now employed in that State.

One of the greatest difficulties in the cow-testing association movement is to secure efficient men to supervise the associations. It is necessary to have some supervision from without, to make them fully effective and to secure their continuance after the end of the first year. Many dairymen mistakenly imagine that all the benefits that can be obtained will be realized in one year of testing, and the end of the first year is therefore a critical time.

It is a prevalent custom for dairymen supplying whole milk to cities to sell every cow to the butcher when she goes dry, and buy a new one. This causes a sad destruction of breeding stock when the good cows go to the block, and efforts are under way to form cow-testing associations among this class of dairymen.

The experience of a Wisconsin dairyman affords a good example of the benefits of the cow-testing associations. For three years before entering the association the average production of his herd ranged from 200 to 216 pounds of butter fat per cow. The first year in the association the average fat production per cow rose to 308.1 pounds. He also found that by feeding a balanced ration in general, but varied to suit the needs of individual cows, the net proceeds were much greater. He entered all his cows in a dairy contest the following year, with the result that every cow of the herd entered the Register of Merit, with an average butter-fat production of 405 pounds per year, and two bulls were qualified to the Register of Merit. With exact knowledge of the production of each cow he has been able to make sales of cows at much higher prices than could otherwise be obtained.

BULL ASSOCIATIONS.

Bull associations are a new form of cooperative breeding association. They have for their object the sure and rapid development of well-built, productive milch cows by means of the purchase and joint ownership of meritorious purebred bulls, by selection of the best dams with regard to yielding ability and pedigree, and by rational and proper treatment of the offspring.

The territory covered by an association is divided into three or four breeding blocks with not more than 60 cows in each. The association stations one bull in each of these blocks for the exclusive use of the members in the block. At the end of every two years the blocks exchange bulls; the bull in block No. 1 goes to block No. 2, the bull in block No. 2 goes to block No. 3, and so on. In this way the member of a bull association, for the initial purchase price of one bull, has the use of a bull for several years, and the cost of bull service is materially reduced. This method also permits the purchase of higher class bulls, since only a few bulls have to be bought, as against one for each herd under ordinary conditions. The selection of breeding animals being based on records of performance, a rapid and sure development of profitable strains of dairy cattle is made possible. The community in turn becomes a breeding center for one particular breed of cattle, and this has a tendency to develop a unity of interest.

During the year two bull associations have been organized and are in successful operation, one in Walsh County, N. Dak., and the other in Carroll County, Md. Still another is in process of formation in North Dakota.

BREEDERS' AND LIVE-STOCK ASSOCIATIONS.

One Guernsey breeders' association was formed in Colorado, and a State Holstein breeders' association was formed in Maryland, largely through the efforts of the field men in these States. Assistance was also given in the organization of four live-stock associations in the South. There are good prospects for the organization of many of these live-stock associations in the South during the coming year. They are beneficial in that they foster cooperation and the improvement of cattle, and may ultimately lead to breeders' and cow-testing associations.

HERD RECORDS.

Where cow-testing associations are not organized, dairymen are encouraged to keep records of their herds. This work has been carried on during the year with 94 herds in the South and West, 42 of which have completed a year's work. In the past, herd records have been kept with a number of farmers in each State, with a view to gathering data which would show how herds may be improved through record keeping and its important resultant factors, namely, the disposal of unprofitable cows, better feeding, and the raising of heifer calves from the best cows only. However, it was found that the desired data were not being obtained, as many cooperators were careless or uninterested, and the large number involved took up too much of the field men's time; the result was incomplete records. It was therefore decided to select a few suitable men in each State and keep records with them for an extended series of years, getting data which will be useful for comparative purposes. The work of instructing farmers in the methods of record keeping, however, will be continued actively. Forty-two purebred bulls have been added to the herds in the South and West as a consequence of the herd record work conducted or introduced by the field men.

DAIRY DEMONSTRATION FARM NEAR DENISON, TEX.

During the last three years the section of Texas in which Denison is located has suffered from severe droughts, the one of 1911 being the worst. Crops in these three years have been almost a total failure. This condition of affairs has been very hard on the demonstration farm. The crop failures necessitated the buying of a great deal of expensive feed, while the extreme heat and our inability to get proper feed at times have hindered to some extent the development of the young stock and have reduced the production of the herd. It is very gratifying that in the face of these trying circumstances the farm is able to show a balance on the profit side for the year 1911. From January 1 to December 31, 1911, the receipts were $2,331.75 and the disbursements $2,238.97, leaving a balance of profit of $92.78.

While no great financial gains have been made, there has been a steady improvement in the condition of the farm and stock. With a favorable season the farm is in condition to respond and to return a profit. A great deal of manure has been hauled from Denison and spread on the farm; leguminous crops have been grown and green manure crops turned under, besides the application of the manure from the herd. All of this has resulted in a marked improvement of the producing power of the soil. The young stock in milk give promise of being a great deal better than their dams. Considering the fact that a heifer with her first calf seldom gives more than 70 per cent of what she will produce when mature, it is estimated that the heifers on the Denison farm will make an increased production averaging 40 pounds of butterfat a year over that of their dams as the result of one cross with a registered bull.

A comparison of the inventories for the years 1909, 1911, and 1912 shows that the total valuation of the property, outside of the increased producing power of the soil, has increased almost $2,000. The live stock alone has increased almost that much. The totals of the inventories for the three years, respectively, are: 1909, $17,084.22; 1911, $17,136.45; 1912, $19,018.40.

OTHER EXPERIMENTAL WORK.

An experiment was begun in June at Summerville, S. C., with a herd of 20 cows for the purpose of determining the effect of dipping cows in an arsenical solution on the production of milk, solids, and fat, also to determine whether cows kept free from ticks will produce more than infested animals.

Other experimental work in which the dairy farming section took part is reported under the heading "Experiments in dairy production."

MARKET MILK INVESTIGATIONS.

Dr. George M. Whitaker, who was in charge of the section of market milk investigations for the first half of the fiscal year, resigned December 31, and since that time this line of work has been under the supervision of Mr. Ernest Kelly. It is largely educational in character with a view to improving local milk conditions, and is carried on mainly in cooperation with city health departments.

IMPROVEMENT OF CITY MILK SUPPLIES.

During the year cooperative work has been carried on with 21 cities and 11 States. This work consists in aiding in the improvement of inspection systems, giving instruction to inspectors, and cooperating in every way possible to help cities develop and maintain an efficient milk-inspection system.

A survey of a representative selection of the dairies supplying the city of Boston was made during the year, and the scores of the dairies inspected were found to average about 45 on a scale of 100.

The use of the score-card system of dairy inspection has spread rapidly. Practically all cities are now using some form of score card; 170 such cities are recorded.

Some of the conditions which act as a handicap to the maintenance of a high-class milk supply are: (1) Municipalities fail to provide sufficient funds; (2) political domination often renders the inspection work inefficient; (3) consumers and often newspapers fail to appreciate the fundamental fact that the production of clean milk entails additional expense as compared with dirty milk.

The clean-milk campaigns too often attempt to make the producer bear the entire cost of improvement without any consideration from the consumer. While many dairies are filthy and should be put out of business, still it is true that it costs more to produce a good grade of milk than it does to produce an inferior grade, and some incentive should be offered to the producer to bring to market the higher grades of milk. The fact of the matter is that the consumer as a rule is not demanding a high grade of milk. It is well recognized that the health authorities of the country generally are seeking to give the public a higher grade of milk than the public is demanding. This emphasizes the great need of general education regarding market milk. Producers, consumers, and officials should endeavor to work in harmony, each giving full consideration to the others. The consumer is entitled to a wholesome product, and the producer should not be allowed to sell unwholesome milk; but the producer deserves a fair price for good milk.

Many cities are making great improvement in their milk supplies. The department endeavors to render all possible assistance, and this aid is of the greatest benefit when a movement for pure milk is first begun.

MILK AND CREAM EXHIBITIONS.

During the year 7 milk and cream contests, in 5 States, were supervised by officials of the Dairy Division, and 334 samples exhibited in these contests were scored and criticized. These contests are doing much good in the way of bringing about improvement in milk supplies.

Eleven exhibits pertaining to market milk, consisting of large photographs illustrative of various conditions, were made by the division at shows and meetings. A new exhibit has been made up, which is of light weight, suitable for shipping long distances, and which includes a set of pictures illustrating many of the most important problems met in market milk work.

MILK INSPECTION FOR GOVERNMENT DEPARTMENTS.

Inspections are made and permits issued for the sale of milk in various departments of the Government at Washington. At the present time six dairies have permits to sell in the Government buildings. A number of dealers have been refused permits on account of the poor quality of their milk. This work is having a very good influence, as the better dairymen are very unwilling to be discredited by having their milk barred from the departments. Efforts are made to assist dairymen in meeting the requirements. It is believed that this work has done much to improve the general milk supply of the city.

OTHER WORK.

A systematic plan of getting information on the important problems in connection with market milk has been put into practice. During the year a collection of dairy laws of cities and States has been brought together to be used for reference. Efforts are being made to obtain and classify useful information upon various subjects, such as the cost of transportation and delivery, cost of buildings, etc.

A new feature of the market milk work this year has been the working out of a score card for stores which handle bulk milk. This does not mean an indorsement of that method of milk distribution. However, since in some cities a great deal of milk is sold from stores, it seems imperative that these stores should be regulated and kept in thorough sanitary condition; and the score card serves a good purpose in facilitating the inspection of these places. Little attempt has hitherto been made in many cities to control milk stores.

Some investigations have been made of the feasibility of denaturing condemned milk and cream in such a manner as to prevent its sale as human food and at the same time to avoid destroying its value for feeding animals. For this purpose a small amount of rennet has been used with some success.

In the past most of our work relative to market milk has pertained to sanitary conditions rather than to economic questions. It is desired to give more attention to economic problems during the coming year. Among the subjects to be studied are the effect of transportation on temperature, porch boxes for delivering milk, and factors influencing the market prices of milk. It is desired also to make a thorough study of the cost of producing milk under average farm conditions. Little definite information is available on this subject.

DAIRY MANUFACTURING INVESTIGATIONS.

The work relating to dairy manufactures, in charge of Mr. S. C. Thompson, includes the inspection of butter, advice and assistance in the management of creameries and other dairy manufacturing enterprises, and the study of processes and products, from the commercial standpoint.

MARKET INSPECTION OF BUTTER.

Butter has been inspected on the markets of New York, Chicago, and San Francisco, but there has been no inspector at Chicago since May 1. In New York 2,200 inspections were made, in Chicago 1,973, and in San Francisco 170.

There is considerable doubt as to the benefits that the creameries derive from this work. The examination of 1,058 reports on butter from 164 factories shows that in the cases of 30 factories an improvement in quality followed, deterioration in quality followed in 35 factories, and in 99 factories there was practically no change. The demand for inspection seems to come more frequently from the butter dealers than from the creameries. The information which market inspection gives of the condition of butter when it arrives on the market is essential to the best work on the part of the creamery, but market conditions under which inferior butter brings a good price render the creamery operators more or less indifferent to the quality of their output. The advisability of discontinuing this work is being considered.

CREAMERY MANAGEMENT.

Many creameries neglect some elements of business management which should be carefully attended to, such as securing proper overrun, preventing leaks, securing good raw material, and marketing to the best advantage.

Reports from 1,500 creameries indicate a loss from abnormally low overrun amounting to $1,391,640.98 in the four States of Minnesota, Wisconsin, Iowa, and Michigan. On the basis of these reports from creameries advice has been given by correspondence, where occasion for it was shown, regarding needed improvements in methods of operation, with a view to stopping these losses.

From the same four States 3,426 shipments of butter were inspected during the last calendar year, of which only 17.5 per cent graded "extras" or above, while 82.5 per cent graded below extras, the difference in price causing an apparent loss to the creameries of $104,101.38. The low grading was due in greater or less part to defective cream in 85 per cent of the cases and to poor workmanship in 40 per cent, which indicates that, while inferior workmanship holds down the quality of butter to a large extent, the chief cause of poor butter is inferior cream.

Circulars touching on some phase of the creamery industry have been prepared and sent out each month to the creameries on our active list. The usual number mailed each month is about 3,000 copies, but in some instances as many as 4,500 have been sent out. Many creameries have expressed their appreciation of this work.

Prior to the year just ended creameries were visited by field men without any regular system, but simply as help was needed. While improvement was made by this method, there was no assurance that the improvement was permanent. This year regular monthly visits have been paid to 22 creameries in Minnesota, Iowa, Texas, Virginia, and California, and a general oversight of their work has been maintained for the purpose of strengthening each weak spot. The results of this system have been very satisfactory.

In Minnesota a cream-grading system was introduced in one creamery, and the quality of the cream was so much improved in consequence that the price obtained for butter increased 4 cents a pound. In other creameries the quality of butter was materially improved, the overrun increased, and the cost of fuel reduced; record systems were generally adopted, and equipment was greatly improved.

At an Iowa creamery the methods have been made more economical; a premium of 7⅗ cents has been secured on sweet cream, which is sold to ice-cream makers; and the price of second-grade cream is now higher than the former price for mixed cream. The number of creamery patrons, of dairy cattle, of purebred bulls, of silos, and of herd-record keepers have all been increased.

In Texas improvement has been sought in methods and equipment. In two creameries record keeping has resulted in making an overrun larger than before. Two creameries have introduced ice-cream making and mechanical refrigerating. There is general improvement in testing and the care of cream.

In California the quality of the output has been improved, cream grading has been adopted, overrun has been increased, salt-testing and moisture-testing apparatus have been installed, and cost of fuel has been reduced.

Visits to creameries other than those under regular observation have not been abandoned. In all, 245 creameries have been visited. The percentage of creameries which do not improve after receiving assistance appears to be small, indicating that the work is substantial. Among the points of improvement are: Cost of manufacturing is more definitely known, overrun has been steadily increasing, leaks and losses are being stopped, and prices paid to patrons for cream are relatively higher as compared with quotations on butter.

Septic tanks have been installed in four Iowa creameries according to plans sent by this office. All these tanks are giving satisfaction.

The cooperative work with the creamery at Troy, Pa., has been very satisfactory. Under the cooperative arrangement the creamery buys the raw material, sells the product, and pays the wages of the workmen, who, however, are employed subject to the approval of the Dairy Division. The division has complete direction of the manufacturing part of the business, being free to make any experiments it desires and to purchase any desired portion of the product for laboratory uses. The work of the creamery has been systematized, the overrun has been increased, and the quality of the butter was so high that it obtained a premium ranging from 1 to 3 cents a pound above Philadelphia quotations. Especially in the winter much improvement over past years has been shown. Much effort has been devoted to developing an efficient system of records, which is now on a very desirable basis.

The experiment at the Algona (Iowa) creamery, in cooperation with the State dairy commissioner of Iowa and the professor of dairying at the agricultural college, has been continued. The object is to demonstrate the practicability of a small dairy community raising its economic status by the employment of a skilled field instructor. The first step was to secure an improved market by supplying sweet cream to an ice-cream factory at an advanced price, and to meet the requirements of this market the farmers were instructed how to keep their cream sweet. A premium of 3 cents a pound of butter fat for sweet as compared with sour cream was offered by the creamery, with the result that nearly all the patrons brought in sweet cream. This difference was maintained throughout most of the year, even after the ice-cream contract expired, and the total amount gained by the farmers by keeping their cream sweet was about $1,100. The drought in the summer of 1911 emphasized the need for better feed, and a special effort is being made to get the patrons to build silos. Also, they are this year, for the first time, growing feed crops specially adapted to dairy production. More than half of the cows and bulls have been of beef or dual-purpose type, but since the field work has been carried on 6 dairy bulls, 15 purebred cows, and a number of grade dairy cows have been brought into the community. Six men have been started to keeping herd records, which is expected to result in further improvement of the stock.

Creameries built and equipped during the year number 86. Attention and information have been given by the Dairy Division as heretofore, including furnishing plans and estimates. Creamery promoters have been active in some States, but we have discouraged the starting of creameries in unsuitable localities.

The working creamery at the International Dairy Show in Milwaukee in October, 1911, was under the charge of an employee of the Dairy Division. This was an important feature of the show and met with great approval.

Ice cream and other side lines.—Ice cream as a "side line" for creameries is becoming more prominent every year. About 400 creameries are recorded as making it during part or all of the year. Reports of a favorable nature have been received from 85 of these. In 82 creameries 772,885 gallons of ice cream were made at a cost of 43.31 cents a gallon, which was sold at an average wholesale price of 77.11 cents a gallon, yielding a profit of 33.8 cents a gallon. These creameries paid a premium to the patrons of 4.65 cents on an average for sweet cream over sour cream.

There are two reasons why this side line should be encouraged: First, the high quality of cream required, and, second, the increased price paid to the producer for good cream.

Feeding hogs on buttermilk is a side line giving satisfactory results; 27 of the creameries reporting to the Dairy Division practice it.

Eleven creameries are buying eggs, which are delivered to them with the cream; the largest number bought by a creamery reporting was 300,000 dozen.

CREAM INVESTIGATIONS AND THE NEED OF CREAMERY INSPECTION.

Investigations have been made of the sanitary condition of creameries and cream-buying stations, also of the quality of the cream received and the methods used in its manufacture into butter, and the conditions under which cream is produced and prepared for market.

A special examination of 144 creameries and cream-buying stations located in 6 different States showed that only 8, or about 5.5 per cent, were absolutely satisfactory from a sanitary standpoint.

An examination of 1,554 lots of cream after being delivered to the creameries and cream-buying stations showed 113, or 7.3 per cent, to be of first grade; 484, or 31.1 per cent, of second grade; and 957, or 61.5 per cent, of third grade. The third grade consists of cream that is dirty, decomposed, or very sour. High acidity in ordinary cream indicates either age or bad conditions surrounding its production, handling, or storage.

An inquiry covering 715 creameries located in 6 States showed that only 196, or 27.4 per cent, pasteurize their cream, while 519, or 72.6 per cent, do not pasteurize.

The results of these investigations may not represent with absolute accuracy the creamery industry as a whole, but they are certainly not far out of the way. While some creameries are in good sanitary condition, receive good cream, practice pasteurization and other approved methods, and turn out a high-grade product, the number of such creameries is very small. Our investigations reveal the fact that 94.5 per cent of the creameries are insanitary to a greater or less degree; that 61.5 per cent of the cream used is dirty or decomposed, or both; and that 72.6 per cent of the cream is not pasteurized, but is made into butter to be consumed in a raw state. In other words, millions of gallons of cream that has been allowed to stand in the barn, in the cellar, or in the woodshed until it is sour or decomposed is sent to the creamery, and without even being pasteurized is made into butter. Butter is usually consumed in the raw state and may carry pathogenic organisms for a long period of time; but, aside from the danger of pathogenic infection, consumers should not be expected to eat a product from an insanitary place and made from material that is unclean and decomposed.

We have been studying this subject for some years and are fully convinced that the welfare of the public, as well as of the dairy industry, demands that something be done to correct these unwholesome conditions. The best remedy is believed to be a system of inspection such as is recommended in an earlier part of this report under the heading "Needed legislation."

OTHER WORK RELATING TO BUTTER.

During the year observations were made on the shrinkage of butter between creamery and market when packed in various ways. While the results are not definite on account of the unsatisfactory methods of weighing on the markets, they show the best method of preparing tubs, and show that when firm-bodied butter is properly packed 10 ounces extra to the 60-pound tub will make it hold out on the market.

In order to ascertain the average composition of creamery butter, 695 samples were collected by field men and State inspectors for analysis in the laboratories, and the results have been published as Bulletin 149.

Representatives of the Dairy Division scored butter at 12 fairs, 15 conventions, and 27 scoring contests; also at the National Dairy Show at Chicago and the International Dairy Show at Milwaukee, and at various creameries in the North Iowa Dairy Improvement Association.

BUTTER FOR THE NAVY.

During the summer of 1911 the Dairy Division superintended the packing of butter for the use of the United States Navy, amounting to 612,000 pounds. The total cost of inspection was $2,450, or less than half a cent a pound. The average score of the butter when packed was 94.75, and after 8 months in storage it was 92.37, a deterioration of 2.38 points, as against 3.03 the year before. The only defect of any importance was a slight storage flavor.

Cans lacquered on the inside were found perfectly free from rust when removed from storage. A case of 24 cans was sent to Cuba and held at high temperature for 2 months to determine whether the melted butter affected the lacquer. It was found it did not, and probably the next specifications for Navy butter will require all cans to be lacquered on the inside.

The 1912 contracts were also packed under the supervision of this division.

CONDENSED MILK.

Early in the year an investigation was made of the condensed-milk industry of the country, securing as far as possible information on the size of the industry, its distribution by States, the capacity of the various factories, their sanitary condition, and the processes employed. The data secured have been compiled and submitted for publication in the department Yearbook.

RENOVATED-BUTTER INSPECTION.

The inspection of renovated or "process" butter and of the factories where it is produced is carried on under the act of Congress of May 9, 1902, and is under the direction of Mr. Robert McAdam. The Dairy Division is assisted in this work by some of the members of the meat-inspection force of the Inspection Division.

Thirty-seven factories bonded for manufacturing renovated butter were in operation during the fiscal year. Two of these are new ones, and three others have gone out of business, leaving 34 at the close of the year.

The total amount of renovated butter produced during the year ending June 30, 1912, was 46,236,589 pounds. The amount for 1911 was 39,352,445 pounds. The amount exported in the fiscal year 1912 was 952,516 pounds, as compared with 118,990 pounds in the fiscal year 1911.

Frequent inspection of these factories has been made by the regular inspectors of the Dairy Division. Twenty-seven factories are inspected daily, semiweekly, or weekly by inspectors from the local offices of the Inspection Division. Every factory in the country has had regular inspection at intervals varying from 1 day to 10 days, with two exceptions. These two are inspected, but less frequently, owing to the irregularity with which they operate and to their location.

The general plan of inspection is to enforce satisfactory sanitary conditions in the factories and to inspect the materials used in the manufacture of renovated butter. Improvements have been made in many of the factories, and as a rule the owners of the plants are willing to comply with any reasonable requests that are made with the view to improving conditions. Reports are made monthly by inspectors in regard to sanitation and weekly in regard to character of materials and product. Any butter containing an excess of moisture (16 per cent or over) is reported to the revenue officers of the Treasury Department. Of 1,641 samples tested during the year only 42 showed an excess of moisture.

As the law authorizes condemnation of packing stock only when it will be deleterious to health in the finished product, it is difficult for inspectors to determine when it should be condemned. A chemical investigation of this matter has been in progress for a year, but it has not removed the difficulty thus far.

The condition of containers for packing stock when shipped is often unsatisfactory, being neither clean nor tight; in hot weather the butter melts and leaks out on the surface.

Experience shows some defects in the renovated-butter law, which is a part of the act of Congress of May 9, 1902. The Secretary of Agriculture is required to cause to be made a sanitary inspection of all renovated-butter factories, but the law does not give him authority to make the regulations necessary for the enforcement of sanitation. The appropriation bill for the ensuing year provides this authority for one year. The Secretary of Agriculture must approve all brands, labels, and marks (except ordinary shipping marks) used on manufacturers' packages of renovated butter going into interstate commerce. There seems, however, to be no such authority when the product is taken from the original package by others than the manufacturer even though it is shipped interstate. Authority for condemning and destroying for food purposes packing stock which is unfit for food is not provided. The manufacturer is permitted to use either of the names "process butter" or "renovated butter." "Process butter" has no significance whatever to the average consumer, while "renovated butter" indicates exactly what the product is.

These defects and other minor defects in the law make it impossible of proper enforcement and render the inspection imperfect and unsatisfactory. A new law throughout is needed, covering the points enumerated in this report under the heading "Needed legislation."

FUTURE WORK.

New work planned for the coming year by the section of dairy manufactures includes the study of butter markets and the methods of marketing butter, with a view to determining the difference between the prices paid to the producer and paid by the consumer; the investigation of the manufacture of ice cream, particularly at creameries; the careful study of the manufacture of creamery by-products on a commercial basis; and the giving of more attention to the commercial operation of cheese factories.

RESEARCH LABORATORIES.

The research laboratories of the Dairy Division, in charge of Mr. L. A. Rogers, have been engaged as heretofore upon various chemical and bacteriological problems in connection with milk, butter, and cheese.

MILK INVESTIGATIONS.

The milk investigations have been a continuation of the work carried on in the preceding year, which is a study of the bacteria of milk and the products resulting from the presence of certain bacteria. This is an unlimited field, and it is hoped to continue this study until the specific characteristics of the common bacteria found in milk are all fully understood.

A new medium for the estimation of the number of bacteria of the colon group has been perfected. Apparatus has been devised and some work done on the effect of ultraviolet rays on bacteria in milk. Special work is in progress on the group of bacteria producing an alkaline reaction and causing decomposition of milk. Work on chemical changes due to pasteurization has been completed, and the results have been prepared for publication.

A study of bacteria found in commercial ice cream is in progress. A study of gas-forming bacteria has been carried on to such an extent that the results are prepared for publication. This study includes the exact analysis of gases from over 100 different cultures, and also a determination of the ability of each to ferment certain carbohydrates and alcohols. A method for preparation of calcium lactate of high purity from whey has been worked out, but has not yet been proven commercially profitable. This method makes possible the utilization of all sugar in the whey.

The investigations in milk secretion have been continued at Columbia, Mo., in cooperation with the University of Missouri Agricultural Experiment Station. One of the principal problems studied is the influence of the plane of nutrition on the composition of the milk, with special reference to the fat constants. The work in which the plane of nutrition has been varied by changing all the food constituents in the same direction has given consistent results and will be followed by experiments in which the variation will be confined to one constituent. The work on the effect of cotton seed, cottonseed meal, and cottonseed hulls on the composition of the milk fat has included an attempt to explain certain inconsistencies in the results by a study of the variations in the composition of cotton seed from various sources and of the relation of other feeds to the influence of cotton seed. Some progress has been made in isolating from butter fat some of the typical fats of cotton seed. The pigment of the milk serum has been identified and found to be distinct from that of the fat. The identification of the pigment of butter fat has been made and its relation to certain pigments of the animal body and of plants established. Considerable work has been done on methods of preserving milk samples.

BUTTER INVESTIGATIONS.

Butter investigations have been continued along the same general lines as those reported last year. Valuable data have been secured relative to the influence of metal salts on the flavor of butter. These salts, even in the smallest traces, have a very marked effect on butter.

Exact determination of the gases in butter have been made, and it has been found that perceptible decrease in oxygen takes place during the storage period. This has an important bearing on the question of oxidation during storage.

Over 50 samples of butter have been analyzed in an attempt to find means of detecting butter neutralized with lime and soda ash, but so far this work has been unsuccessful.

A simple test has been perfected for determination of fat in butter.

Work on the manufacture of butter for storage has been completed. The results consistently show much higher keeping quality in butter made from sweet pasteurized cream. This work includes also the effect of storage temperatures. Results have been submitted for publication.

A new method of producing dairy cultures of exceptional virulence has been successfully perfected. This work is of essential importance in the manufacture of starters, etc.

CHEESE INVESTIGATIONS.

Swiss cheese.—In continuing the investigations regarding the Swiss type of cheese much has been required in the way of working out methods. By the use of some of these methods it has been possible to follow the bacteriological changes in Swiss cheese through the entire ripening period. Several hundred cultures are being studied in connection with this work, and a paper is being prepared on the normal bacteria of Swiss cheese, giving the results.

Much work has also been done on the gases that are found in Swiss cheese. It has been found that normal cheese contains only carbon dioxid and nitrogen, while abnormal chese contains also hydrogen. These results in detail have been published as Bulletin 151. Chemical and bacteriological studies in this connection as made so far lead us to believe that eventually it will be possible to control the ripening of Swiss cheese entirely by the use of pure cultures. This field offers fine opportunities for research.

Cheddar cheese.—In connection with the cooperative work at the Wisconsin Agricultural Experiment Station on the Cheddar type of cheese it has been demonstrated for the first time that bacteria of the *Bacillus bulgaricus* type grow in large numbers after the sugar has been entirely fermented and lactic-acid bacteria have diminished. Results of this work have been submitted for publication. A comparison has been made of the acid test and the rennet test for the purpose of determining the condition of milk for cheese making, with the result that it is found that wide variations may occur in the bacterial content of different milks without appreciably affecting the amount of acid, but there seems to be a close relation between the time required for coagulation with rennet and the number of bacteria present.

Chemical work on Cheddar cheese has been devoted largely to a comparison of the acids, esters, and alcohols in cheese of poor and of good flavor, with the object of throwing some light on the origin of flavoring matter. Definite conclusions are not yet warranted.

The work on manufacture of cheese from pasteurized milk has been continued, with the result that a product uniform both as to texture and flavor can be made. This system is being tried out on a commercial scale, and may afford considerable advantage to the cheese maker.

Soft cheese.—The cooperative soft-cheese investigations have been continued at the Storrs (Conn.) Agricultural Experiment Station. Work in this field has been carried on sufficiently to indicate the possibility of making Camembert cheese commercially in this country; however, no manufacturer apparently has been entirely successful as yet. A factory demonstration has been arranged for. A good cheese of the Roquefort type has been made experimentally from cow's milk. We hope to be able to try this out on a commercial scale. Chemical work has been devoted to a study of the flavoring substances of soft cheese. Work is in progress on a monograph on the genus *Aspergillus*, corresponding to the revision of the *Penicillium* already published.

PLANS FOR THE COMING YEAR.

In addition to continuing the studies above reported, it is planned to undertake a new problem pertaining to the utilization, in the arts and as food, of by-products from the creamery and cheese factory, many of which now go to waste or are utilized in an inefficient way. Considerable work has been done on this problem incidentally by those who are studying various other problems, but it is desired to place at least one man on this work as a main problem of research.

A considerable share of the division's laboratory work is being done at certain State experiment stations with which we are cooperating. It is believed that economy and efficiency would be promoted by concentrating this work, or such portions of it as are to be continued in the future, in the main laboratory at Washington, since better facilities are now available there. Steps have therefore been taken to move this work to Washington during the coming year, in which case, however, due consideration will be given to the institutions with which we are cooperating, and a fair and just dissolution of the cooperative arrangements will be made. It may be that some of these institutions will continue some of the work themselves, in which case arrangements can be made so as to prevent direct duplication.

DAIRY DIVISION FARM, BELTSVILLE, MD.

In March, 1912, 185.7 acres of the farm at Beltsville, Md., which had been purchased by the bureau in the latter part of the preceding year, was assigned to the Dairy Division for its use. Mr. R. R. Welch was placed in charge as superintendent. The farm was in very rough condition when it became the property of the bureau, and there remained much work to be done in the way of clearing, ditching, etc.

During the spring of 1911 about 15 acres were thoroughly tiled and some 6-inch mains were laid to remove the surplus water from some of the remaining wet spots and valleys, the idea being to connect laterals with these mains from time to time, as funds would permit, until the place is thoroughly drained. During the spring and early summer of 1911 the entire farm, with the exception of 4 or 5 acres of stumpy land, was plowed and planted. About 62 acres was planted to corn; the remainder of the place was sown to cowpeas and other hay crops, a part of which were harvested for hay and the remainder plowed under to improve the soil. The crops harvested from the farm are as follows: Hay and stover, 111 tons; silage, 258 tons; corn, 1,120 bushels. The approximate value of these crops based on market values was $3,902.28. The cost of producing these crops, aside from the salary of the superintendent, was $4,582.92. Taking into consideration that the peas and clover grown on approximately one-third of the place were turned under for soil improvement, and also the rough condition of the place, the showing made is as good as could be expected.

A complete water system, provided for from the funds of the fiscal year 1911, is operating satisfactorily. The system consists of a well 325 feet deep, with automatic pumping equipment, inclosed in a small concrete pump house, and a 10,000-gallon pneumatic tank, with pipe lines connecting it with all buildings on both Animal Husbandry and Dairy Division farms.

A high-tension transmission line from the electric railway to the building on the Animal Husbandry farm, with suitable transformers, all of which was provided for from funds of the fiscal year 1911, were completed during the fall of 1911, and are working satisfactorily.

Two concrete silos 14 by 42 feet were completed and filled during the fall of 1911. A concrete feed barn 40 by 100 was begun during the fall of 1911 and has since been completed. At the east end of the feed barn there is a cattle wing 36 by 59 feet, of the open-shed type, with milking room in one end of it. A small frame milkhouse was built near the milking room of the barn and connected with it by a covered passageway. At the west end of the feed barn work has been begun on another cattle stable 37 by 59 feet of the ordinary type of dairy stable, with concrete floor and stanchions. The object in having the two kinds of stables is to determine their comparative merits.

During the year, when other work would permit, the construction of a permanent road into the farm has been in progress. The surface consists of sand and clay.

EXPERIMENTAL WORK IN DAIRY PRODUCTION.

Some lines of experimental work in dairy production were prepared for and begun at other places before the Beltsville farm was equipped for experimental work. It is the intention, however, to carry on hereafter all work of this kind so far as practicable at that farm. These investigation are now in charge of Mr. T. E. Woodward.

An experiment was begun in the fall of 1911 at Brownsville, Tex., in cooperation with the Office of Farm Management of the Bureau of Plant Industry, with the object of determining the value of cactus as a feed for dairy cattle in localities where the cactus can be readily grown and where other forage crops are more or less limited on account of climatic conditions. The principal points that are being studied in this investigation are the quantity of cactus that the animals can consume economically, the feeding value of cactus as compared with other feeds, its effect upon the vigor of the animals and upon their offspring, its effect upon the quality of the milk, and its digestibility. Thirteen grade Jerseys were purchased for these experiments.

Some of the results thus far indicate that cactus can be successfully fed to dairy cattle, that it is palatable, and that some cows weighing 800 pounds will consume as much as 150 pounds daily. It has a laxative effect when fed in large quantities, and as a sole roughage it is unsatisfactory. Ten pounds of cactus seems to be worth about as much as 1 pound of sorghum hay. It apparently does not affect the flavor of milk or butter, but imparts a yellow color to butter. When fed alone, it may lead to fatal results on account of the amount of coarse fiber it contains, causing a mechanical stoppage in the intestinal tract. One man can singe 1 ton of cactus in an hour, using 1½ gallons of gasoline. The 2-year-old growth of cactus from which we are feeding yields at the rate of 180 to 190 tons an acre. Cattle fed highly on cactus yield milk containing a smaller percentage of butter fat than those receiving only dry feed. The indications thus far are that in dry sections where the cactus thrives it may be used to advantage in feeding dairy cattle.

During the preceding fiscal year a preliminary experiment was carried on at Wiley, Va., to determine the value of cornstalk extract as a feed for dairy cattle. During the past year this experiment was continued at Annapolis, Md., with 8 animals from the Naval Academy herd, which were fed for a period of 120 days. This experiment will be continued on the experimental farm at Beltsville to determine the digestibility of this product. The results thus far show that cornstalk extract is worth about $11 a ton as compared with other feeds at market prices. This extract is a by-product resulting from the preparation of cornstalks for paper making, which work is being carried on in the Bureau of Plant Industry.

Experimental work at the Beltsville farm will be developed as rapidly as conditions will permit. Some of the work already started or planned is as follows: An experiment in inbreeding, for which 16 grade and scrub cows of promiscuous breeding and a Guernsey bull have been purchased, the object being to determine whether or not a scrub or grade herd can be satisfactorily improved by breeding all of the heifers from the original cow back to their own sire, and after that to pursue the ordinary methods of line breeding; a comparison of the open-shed stabling of cows with stabling in the ordinary type of dairy barn; a study of silage kept in a stave silo as compared with that kept in a concrete silo; a study of the effect of succulent feed upon the percentage of fat in milk; a study of the effect of feeding sour milk to calves; a study of the use of silage as compared with soiling crops, including the cost of both feeds; the continuation of a study of stable ventilation with a view to determining, if possible, the amount of ventilation that is actually necessary for an animal; a study of the effect of the palatability and quantity of a ration upon its digestibility; and a study of the essential differences between good and poor animals.

NAVAL ACADEMY DAIRY.

Mention has already been made of the dairy established by the United States Naval Academy at Annapolis, Md., to supply that institution with milk. The dairy has now been in operation for over a year, and the health record of the midshipmen has been greatly improved, as previously stated. The plant is not quite complete as yet; one wing of the cow stable is unfinished and some additional animals have to be purchased for the herd. The financial outcome of the venture, of course, can not be determined at the end of only one year's operation, but there is good ground for believing that it will be profitable financially as well as hygienically. A great deal of credit is due to Paymaster Bryan, whose untiring efforts have overcome many difficulties in the way of the enterprise. The usefulness of this dairy will demonstrate, as is believed, the desirability of similar institutions generally maintaining their own dairies.

DAIRY ENGINEERING.

One of the features of the dairy engineering work during the fiscal year has been a study of refrigeration, including compressors and storage rooms. Lack of knowledge regarding the special requirements of refrigeration for dairy uses has caused, it is believed, many inadequate installations. A circular has been prepared covering this special field in refrigeration. Other studies have related to the most economical use of fuel in creamery and milk plants, the cost of pasteurizing a flow of milk or cream, and a practical method of freezing milk.

In addition to the foregoing, a large number of plans for all kinds of dairy buildings have been prepared and sent out for use in the field. Special plans have been made for the Naval Academy dairy and the Beltsville experimental farm.

WESTERN INVESTIGATIONS.

On account of the splendid opportunity for educational work along dairy lines in the Rocky Mountain and Pacific Coast States and on account of the growing demand for the kinds of work which the Dairy Division has been carrying on in that section for the past two years, and also because of the great distance of that section from Washington, plans have been made to organize a new section in the division to handle the work in those regions, with headquarters in Salt Lake City, Utah. Western investigations will include all work done in the Rocky Mountains and the Pacific coast region, whether in connection with creameries, market milk, or dairy farming, and the man in charge will report directly to the chief of the division. The organization for this work differs from that of the remainder of the division in that this includes the whole dairy field, whereas the other sections cover only certain branches.

THE INSPECTION DIVISION.

The work of the Inspection Division, consisting of the meat inspection and the control and eradication of contagious diseases of animals, under the direction of Dr. R. P. Steddom, chief, was continued as previously up to the end of the fiscal year. Beginning with the new fiscal year, this division has been reorganized as two separate divisions, designated as the Meat Inspection Division and the Field Inspection Division.

THE MEAT INSPECTION.

The meat-inspection work for the fiscal year 1912 shows an increase along all lines, especially in the number of post-mortem inspections, the amount of meat food products prepared, and the export shipments of meats and meat food products. The per cent of increase is shown under the respective classes of work.

Inspection was conducted during the fiscal year at 940 establishments located in 259 cities and towns, as compared with 936 establishments in 255 cities and towns during the fiscal year 1911.

Inspection was inaugurated at 82 establishments and withdrawn from 93 establishments during the year, as compared with 108 establishments inaugurated and 78 withdrawn during the fiscal year 1911. Of the 93 withdrawals during the fiscal year 1912, 71 were caused by discontinuance of business on the part of the establishments; in 14 cases the withdrawal was due to insanitary conditions, failure to meet the requirements of the department, or to violation of the regulations; while in the remaining 8 cases the inspection was withdrawn by request.

The following statement shows the number of establishments and the number of cities and towns where the inspection of meat and meat food products has been conducted by the bureau in each fiscal year, beginning with 1891:

Number of establishments and number of cities and towns where meat inspection has been conducted, fiscal years 1891 to 1912, inclusive.

Year.	Establishments.	Cities and towns.	Year.	Establishments.	Cities and towns.	Year.	Establishments.	Cities and towns.
1891	9	6	1899	139	42	1907	708	186
1892	23	12	1900	149	46	1908	787	211
1893	37	16	1901	157	52	1909	876	240
1894	46	17	1902	155	50	1910	919	237
1895	55	19	1903	156	50	1911	936	255
1896	102	26	1904	152	51	1912	940	259
1897	128	33	1905	151	52			
1898	135	35	1906	163	58			

During the fiscal year market inspection was extended to one more city, making a total of 42 cities at whose public markets Federal meat inspection is conducted in order that interstate deliveries may be made without violating the meat-inspection law and regulations.

ANTE-MORTEM INSPECTIONS.

The number of animals inspected before slaughter is given in the following statement, which shows an increase in all species except cattle, and a total increase of 11.5 per cent as compared with the fiscal year 1911.

Ante-mortem inspections of animals, fiscal year 1912.

Kind of animals.	Passed.	Suspected.[1]	Total inspected.
Cattle	7,507,579	41,298	7,548,877
Calves	2,228,477	3,145	2,231,622
Sheep	14,218,522	3,603	14,222,125
Goats	64,070	32	64,102
Swine	34,981,804	63,291	35,044,995
Total	59,000,452	111,369	59,111,821

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[1] This term is used to designate animals found or suspected of being unfit for food on ante-mortem inspection, most of which are afterwards slaughtered under special supervision, the final disposition being determined on post-mortem inspection.

POST-MORTEM INSPECTIONS.

The post-mortem inspections for the fiscal year 1912 show an increase of 11.4 per cent over the fiscal year 1911. All species show an increase in the number slaughtered except cattle, which show a slight decrease. The number of swine slaughtered was over 5,000,000 more than in 1911, an increase of nearly 17 per cent, and an increase of 9 per cent over the average for the five years preceding.

Post-mortem inspections, fiscal year 1912.

Kind of animals.	Passed for food.	Passed for lard and tallow only.	Condemned.	Total.
Cattle	7,477,227	4,415	50,363	7,532,005
Calves	2,233,984	18	8,927	2,242,929
Sheep	14,192,420	902	15,402	14,208,724
Goats	63,898	1	84	63,983
Swine	34,689,866	147,510	129,002	34,966,378
Total	58,657,395	152,846	203,778	59,014,019

In the foregoing table are included the post-mortem inspections of the carcasses of animals "suspected" on ante-mortem inspection, the final inspections of carcasses that were "retained"[1] at the time of slaughter, and the carcasses of animals slaughtered without ante-mortem inspection and presented to official establishments with the head and viscera attached.

The various diseases and conditions for which fresh carcasses and parts were condemned and tanked are shown in the following table:

Diseases and conditions for which condemnations were made on post-mortem inspection, fiscal year 1912.

Causes of condemnation.	Cattle.		Calves.		Swine.		Sheep.		Goats.	
	Carcasses.	Parts.	Carcasses.	Parts.	Carcasses.	Parts.	Carcasses.	Parts.	Carcasses.	Parts.
Tuberculosis	35,273	51,576	276	289	42,267	314,581	3	......	......	......
Actinomycosis	726	71,665	7	345	......	......	......	......	......	......
Caseous lymphadenitis	......	......	......	......	......	......	1,597	......	18	......
Hog cholera	......	......	......	......	56,931	......	......	......	......	......
Tumors and abscesses	190	4,840	17	165	1,654	2,247	122	31	3	1
Septicemia, pyemia, and uremia	1,468	......	326	......	8,607	......	780	......	6	......
Pregnancy and recent parturition	560	......	......	......	71	......	70	......	1	......
Immaturity	......	......	4,511	......	......	......	......	......	......	......
Pneumonia, pleurisy, enteritis, hepatitis, peritonitis, metritis, etc	3,092	......	841	......	8,997	......	2,614	......	12	......
Icterus	40	......	37	......	2,975	......	1,308	......	2	......
Texas fever	381	......	806	......	......	......	......	......	......	......
Injuries, bruises, etc	1,892	813	429	69	728	5,916	725	113	3	......
Sexual odor	......	......	......	......	2,456	......	......	......	......	......
Asphyxiation	......	......	......	......	967	......	32	......	1	......
Emaciation	5,722	......	1,574	......	1,568	......	7,512	......	29	......
Cysticercus	359	1,944	3	3	9	......	197	44	1	......
Miscellaneous	660	3,945	100	341	1,772	1,248	412	3,683	8	......
Total	50,363	134,783	8,927	1,212	129,002	323,992	15,402	3,871	84	1

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[1] This term is applied to carcasses held on suspicion on first post-mortem examination to be subjected later to more thorough examination for determining final disposition.

In addition to the foregoing there were tanked the carcasses of animals found dead or in a dying condition, as follows: Cattle, 762; calves, 983; swine, 44,778; sheep, 5,162; goats, 10; total, 51,695.

SUPERVISION OF MEATS AND PRODUCTS PREPARED AND PROCESSED.

The amount of meat and meat food products prepared and processed under the supervision of bureau employees is shown in the following statement, being an increase of 4.9 per cent over the fiscal year 1911. It should be noted that this table is a statement of work performed rather than a report of the actual amount of product prepared, and the same product may be included under several headings, as it is reported in the various stages of preparation:

Meat and meat food products prepared and processed under bureau supervision, fiscal year 1912.

Kind of product.	Weight.	Kind of product.	Weight.
	Pounds.		*Pounds.*
Beef placed in cure	191,318,118	Lard stearin	5,685,160
Pork placed in cure	2,633,752,286	Lard compound	4,395,376
All other classes placed in cure	2,990,686	Lard substitute	641,397,765
Sausage chopped	523,893,289	Bakers' compound	2,649,900
Canned beef	121,792,241	Oleo stock and edible tallow	60,035,299
Canned pork	27,607,492	Oleo oil	155,504,587
All other canned meats	4,471,459	Oleo stearin	81,498,603
Meat extract	396,201	Oleomargarin	128,318,639
Steam and kettle rendered lard	1,187,768,294	Miscellaneous products	1,377,022,302
Leaf lard	21,053,976		
Neutral lard	100,317,357	Total weight	7,279,558,956
Lard oil	7,689,926		

The quantity of meat and meat food products condemned on reinspection during the fiscal year because of having become sour, tainted, putrid, unclean, rancid, or otherwise unwholesome was as follows: Beef, 7,911,761 pounds; pork, 9,937,949 pounds; mutton, 192,326 pounds; veal, 52,934 pounds; goat meat, 1,617 pounds; total, 18,096,587 pounds. This is a decrease of 14.2 per cent compared with the fiscal year 1911. It should be stated, however, that the quantity condemned in 1911 was unusually large on account of an extensive fire at one establishment where over 3,000,000 pounds were condemned. But after deducting this amount and allowing for the increased amount inspected in 1912, there is still a decrease, showing a continued improvement in sanitary conditions and in methods of preparing and handling the products.

INTERCHANGE OF MEATS BETWEEN INSPECTED ESTABLISHMENTS.

Considerable quantities of meats and meat food products that have been inspected and passed are transferred between inspected establishments, this traffic being closely supervised and the meats and products identified by means of marks and seals. During the fiscal year there were transferred in this manner 3,392,828,258 pounds of meats and meat food products, part of which was contained in 20,354 sealed cars and 13,764 sealed wagons.

MEATS AND PRODUCTS CERTIFIED FOR EXPORT.

The quantities of meat and meat food products certified by the bureau for export are shown in the following table, being an increase of 19.4 per cent over the fiscal year 1911:

Inspection certificates issued for export of meat and meat food products, fiscal year 1912.

Kinds.	Number.	Beef.	Mutton.	Pork.	Total.
		Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Regular	67,274	179,431,220	4,820,237	660,424,447	844,675,904
Preservative	36,255	1,407,987		268,195,667	269,603,654
Total	103,529	180,839,207	4,820,237	928,620,114	1,114,279,558

There were also issued 2,599 "inedible product" certificates, covering exports of 23,058,627 pounds of such inedible products as hoofs, horns, casings, bladders, bungs, etc.

EXEMPTION FROM INSPECTION.

The provisions of the meat-inspection law requiring inspection do not apply to animals slaughtered by farmers on the farm nor to retail butchers and dealers. The department requires that such butchers and dealers, in order to ship meats and meat food products in interstate commerce, shall first obtain certificates of exemption, but no such requirement is made of farmers. The number of certificates of exemption outstanding at the close of the fiscal year was 2,334, as against 2,546 at the close of the previous fiscal year, a decrease of 212 certificates. During the year it was found necessary to call in and cancel for various causes 825 certificates of exemption. In many of these cases, however, the certificates were reissued later, when business was resumed or when insanitary conditions had been corrected.

During the past fiscal year 124,859 shipments were made by retail butchers and dealers holding certificates of exemption, as against 116,536 shipments in 1911. The products so shipped in the fiscal year 1912 were as follows:

Shipments made under certificates of exemption from inspection during the fiscal year 1912.

Kind of products.	Number.	Pounds.	Kind of products.	Number.	Pounds.
Beef, carcasses (1,313 quarters)	328	156,787	Cured meats		1,586,485
Calves, carcasses	69,750	5,723,306	Lard		136,199
Sheep, carcasses	7,391	291,599	Sausage		185,917
Swine, carcasses	1,729	128,606	Miscellaneous (scrapple, tripe, head cheese, beef fat, etc.)		148,887
Beef, fresh		8,980,618			
Veal, fresh		611,723	Total	79,198	20,493,837
Mutton, fresh		1,966,982			
Pork, fresh		576,728			

INSPECTIONS FOR THE NAVY.

Upon request of the Navy Department, occasional inspections of meats and meat food products were made for the Navy during the year, to determine whether they conformed to the Navy specifications. The meats and products inspected aggregated 9,688,427 pounds, of which 475,154 pounds were rejected. Rejections were made on account of the sour, slimy, or putrid condition of the product, for failure to comply with the specifications regarding the weight or the amount of fat, and because of the substitution of buck, bull, heifer, or cow meat for the meat of wethers and steers. There were also inspected for the Navy 37,406 dozen eggs, 8,456 dozen of which were rejected.

CONTROL OF CONTAGIOUS DISEASES.

TEXAS FEVER.

The number of cattle shipped from the quarantined area to northern markets during the fiscal year 1912 was 998,338, as compared with 934,910 during the preceding year, being an increase of 6.78 per cent. These cattle were transported in 36,647 cars, 35,750 of which were cleaned and disinfected under bureau supervision. During the year 196,453 reshipments in 7,265 cars were made from quarantine pens.

The number of inspections of cattle of the quarantined area during the fiscal year was 260,351, as compared with 103,338 during the preceding year. The number of dippings during the year was 162,395, being an increase of 255.78 per cent over the dippings of 1911. Of this number 52,971 were second dippings.

During the fiscal year 2,900 certificates were issued for the shipment to northern markets of free cattle and those dipped or otherwise treated as provided in the regulations, as compared with 983 certificates issued in 1911.

TICK ERADICATION.

As the result of the work done in cooperation with authorities of various Southern States for the extermination of the ticks which spread the infection of Texas fever of cattle, areas aggregating 22,827 square miles, as shown by the following table, were released from quarantine during the fiscal year. The total area released since the beginning of this work in 1906 amounts to 162,648 square miles.

Areas released from Texas fever quarantine as a result of eradicating cattle ticks, fiscal year 1912.

States.	Square miles.	States.	Square miles.
California	3,386	Tennessee	1,320
Oklahoma	2,557	Texas	5,240
Missouri	1,152	Virginia	96
Mississippi	2,182	Georgia	257
Arkansas	859		
North Carolina	1,981	Total	22,827
South Carolina	3,797		

In addition to the States named, operations are being carried on in the States of Alabama and Louisiana.

During the year the total number of inspections made by bureau employees was 4,324,540, of which 3,384,189 were reinspections. This is an increase of 7.6 per cent over the inspections for 1911.

SCABIES IN SHEEP.

During the fiscal year 1912 the area quarantined for scabies in sheep has been reduced by releasing from quarantine 21 counties and parts of 5 counties in the southwestern part of Kentucky, comprising about 9,177 square miles.

The number of inspections made by bureau employees during the year was 62,261,020, an increase of 10.03 per cent over the previous year. The number of dippings supervised by bureau employees during the year was 13,891,648, an increase of 9.24 per cent. There were very large increases in the number of inspections and dippings in the States of Utah and Wyoming and to a lesser extent in the States of Idaho, Colorado, Missouri, Michigan, Illinois, and Indiana. Bureau employees also supervised the cleaning and disinfection of 2,005 cars.

SCABIES IN CATTLE.

The number of inspections for scabies in cattle during the fiscal year was 17,920,364, a slight decrease from the preceding year. The number of dippings of cattle during the year was 1,180,296, also a slight decrease. There were cleaned and disinfected 4,748 cars.

SCABIES IN HORSES.

The number of inspections of horses and mules for scabies during the fiscal year was 2,873, a decrease of 19.07 per cent as compared with the previous year. No dippings for this disease were made during the fiscal year 1912.

GLANDERS IN HORSES.

The number of inspections of horses and mules for glanders at Indian schools and agencies was 10,972, of which number 78 were found diseased and were quarantined and destroyed. This work was done in cooperation with the Office of Indian Affairs of the Department of the Interior.

LIP-AND-LEG ULCERATION OF SHEEP.

At the beginning of the fiscal year 22,175 square miles still remained in quarantine for lip-and-leg ulceration (necrobacillosis) of sheep. This entire area was released from quarantine on August 10, 1911. During this period there were inspected for this disease 649,840 sheep, of which number 54,795 were dipped and hand treated in compliance with the regulations.

INSPECTION OF LIVE STOCK FOR INTERSTATE MOVEMENT.

Cattle.—During the fiscal year 1912, in compliance with the laws of the States to which destined, there were inspected by bureau veterinarians 117,708 cattle moving interstate for purposes other than immediate slaughter, of which number 19,759 were tested with tuberculin. Of the number tested, 609 were found to be diseased with tuberculosis and 60 showed temperatures which required them to be held as suspects for further examination. These figures show an increase of 125 per cent in the number inspected and 5 per cent in the number tested over the fiscal year 1911.

Horses and mules.—There were likewise inspected 43,689 horses and mules intended for interstate movement. Of this number, 9,137 were tested with mallein, 169 of which showed typical reactions to the test. The number inspected shows an increase of 25.58 per cent and the number tested an increase of 57.8 per cent over the fiscal year 1911.

VIOLATIONS OF LIVE-STOCK TRANSPORTATION LAWS.

During the fiscal year 1,012 reports of alleged violations of laws concerning the interstate transportation of live stock were submitted by bureau employees and referred to the Department Solicitor for action. The Solicitor referred 900 of the cases to the Department of Justice for prosecution, and many of these court cases required special investigations and the collection of evidence by employees of the bureau who cooperated with the United States attorneys in charge of the prosecutions.

Of the total reports above mentioned, 891 were for violations of the so-called 28-hour law and the remaining 121 for violation of the quarantine laws. Eighty-four per cent of the court actions resulted in the imposition of fines amounting in the aggregate to $32,664.44, and an additional amount of $4,666.50 was collected in fines for cases filed previous to July 1, 1911.

THE QUARANTINE DIVISION.

The Quarantine Division, of which Dr. R. W. Hickman is the chief, supervises the work of the bureau in connection with the exportation and importation of live stock, including the inspection and equipment of vessels carrying the same; the management of quarantine stations at the various ports of entry for imported animals; the inspection in Great Britain, prior to their shipment, of animals destined for the United States; bovine tuberculosis investigations in cooperation with State and municipal authorities and medical milk commissions; and the inspection and disinfection of imported hay, feedstuffs, hides, hair, wool, glue stock, etc. It also conducts investigations of animal diseases in Porto Rico and the Hawaiian Islands, and carries on a miscellaneous correspondence relating to diseases of animals.

INSPECTION OF VESSELS AND EXPORT ANIMALS.

During the fiscal year 314 inspections of vessels carrying live stock were made before clearance, and 618 certificates of inspection were issued for American cattle, sheep, and horses. The following table gives statistics of inspections of live animals for export during the year:

Inspections of American and Canadian animals for export, fiscal year 1912.

Kind of animals.	American.				Canadian.		
	Inspections.	Rejected.	Tagged.	Exported.	Inspections.	Rejected.	Exported.
Cattle	154,866	86	83,045	87,684	26,987	8	26,979
Sheep	53,242	21		25,854	283		283
Swine	92			109			
Horses	1,099			1,212			7
Mules	410			430			
Asses	5			5			
Goats	1			1			
Total	209,715	107	83,045	115,295	27,270	8	27,269

Most of the animals included in the above statement were shipped to Great Britain, namely, of American animals, 77,143 cattle, 16,574 sheep, 454 horses, and 2 asses, and of Canadian animals, 24,589 cattle and 1 horse.

As a result of the inspection of the equipment of vessels carrying export animals, statistics show a maintenance of the already low percentage of loss of animals at sea. Of cattle shipped to British ports but 0.19 per cent were lost at sea, and of sheep but 0.40 per cent were lost.

During the fiscal year 25,110 horses and 1,426 mules were inspected and tested with mallein for shipment to Canada. Of this number 232 horses and 2 mules were rejected on account of having reacted to the test.

For shipment to Canada there were also tested with tuberculin 858 cattle, of which 19 reacted, and inspections were made of 58,783 sheep, 234 goats, and 39 swine.

For shipment to the Hawaiian Islands there were tested with tuberculin 130 cattle, of which 39 reacted, and the mallein test was applied to 317 horses and 646 mules, of which 5 horses and 13 mules reacted.

INSPECTION AND QUARANTINE OF IMPORTED ANIMALS.

Certain changes concerning the importation of horses and dogs have been made in the regulations known as Bureau of Animal Industry Order 180, "Regulations for the inspection and quarantine of horses, cattle, sheep, swine, and other animals imported into the United States," with a view to strengthening the safeguards of this Government against the possible importation with such animals of the infection and contagion of animal diseases. The regulation governing the importation of dogs was promulgated in the last quarter of the preceding year, and, in addition to requiring the inspection of all dogs imported into the United States from countries other than North America, requires that collie, shepherd, and sheep dogs shall be subject to both inspection and quarantine. Under this regulation 87 dogs have been quarantined during the year and subjected to the necessary examination for tapeworm infection, of which 26 were found to contain varieties of tapeworm eggs or segments, none of which, however, proved to be *Tænia cœnurus*, the tapeworm which produces gid in sheep. Each of the 26 animals was medically treated and freed from infection before release.

All cattle, sheep, and other ruminants and swine, except from North America, have been, since the organization of the bureau, subject to both inspection and quarantine, and importation is allowed only on permits which must be obtained from the Secretary of Agriculture prior to their shipment from the country of origin. The regulations have likewise required that such animals be accompanied by health certificates from the proper local authorities of the district in which they have been continuously located during the preceding six months, and by affidavits of the owner and the shipper or his agent, showing that there had been no contagious disease of live stock affecting the said kind of animals in the district from which shipped, and that they had not passed through any district infected with contagious disease, or been exposed in any possible manner to any contagious disease for six months prior to the date of shipment; also that they were shipped in clean and disinfected cars and vessels direct from the farm where purchased.

Previous to the past year horses were admitted from any part of the world on passing a satisfactory examination at the port of entry, but under date of April 29, 1912, an order of the Secretary became effective, which requires certificates and affidavits for horses practically the same as those required for ruminants and swine, except that the communicable diseases scheduled are more particularly those which chiefly affect horses, principally dourine.

Hay, straw, or forage which accompanies shipments of horses from any country on the Continent of Europe is not allowed to be landed until it has been disinfected as the inspector of the Bureau of Animal Industry may prescribe.

Owing to the existence of communicable diseases of animals among live stock in various parts of the world, importations of cattle, sheep, and other ruminants and swine from over seas have been mainly restricted to Great Britain, Ireland, and the Channel Islands, and during a portion of the year importations from the United Kingdom have not been permitted on account of the recurrence of foot-and-mouth disease in England. The animals imported during the fiscal year are shown in detail by the following tables:

Number of imported animals inspected and quarantined, fiscal year 1912.

Port of entry.	Cattle.	Sheep.	Swine.	Other animals.
New York	2,054		3	169
Boston	265	677		
Baltimore	15		2	3
Canadian border ports	120	204	29	1
Total	2,454	881	34	173

Number of imported animals inspected but not quarantined, fiscal year 1912.

Port of entry.	Cattle.	Sheep.	Swine.	Horses and ponies.	Mules and asses.	Burros.	Donkeys.	Zebras.	Goats.	Deer.	Other animals.
New York				3,066	1		7				17
Boston			2	53	1						2
Philadelphia				8	1						60
Baltimore				48							
Portland, Me				16							
San Francisco				1							1
New Orleans				9	22						
Mexican border ports	319,744	11,955	1,046	1,637	2,335	80			10,792	15	
Canadian border ports	1,305	17,651	242	5,792	53	9	6	14	19	15	265
Total	321,049	29,606	1,290	10,630	2,413	89	13	14	10,811	30	345

TUBERCULIN TESTS IN GREAT BRITAIN.

The regulations governing the importation of animals subject to inspection and quarantine provide that all cattle 6 months old or over imported from Great Britain, Ireland, and the Channel Islands shall be tested with tuberculin by an inspector of the Bureau of Animal Industry before being exported or after arrival at the animal quarantine station at the port of entry. The following table shows the results of such tests made in Great Britain during the fiscal year:

Results of tuberculin tests in Great Britain of cattle for importation, fiscal year 1912.

Breed.	Passed.	Failed.
Alderney	48	....
Ayrshire	264	36
Dexter	93	11
Guernsey	631	12
Jersey	638	5
Total	1,674	64

NOTE.—Eight Ayrshire, 1 Dexter, and 1 Guernsey were not shipped, owing to having been exposed to tuberculous cattle.

SUPPRESSION OF BOVINE TUBERCULOSIS.

TUBERCULIN TESTING OF CATTLE IN VIRGINIA AND MARYLAND.

The tuberculin testing of dairy cattle in Virginia and Maryland was started in 1907 in cooperation with the health department of the District of Columbia. The systematic work of eradicating cattle tuberculosis from the District of Columbia was taken up under an order of the Commissioners of the District, approved by the Secretary of Agriculture November 27, 1909. In 1910 the work was extended to cooperate with the dairy and food division of the State of Virginia. These closely related lines of work have been continued throughout the past year with encouraging results, as is evidenced by the increased number of cattle tested, the marked reduction in the percentage of reacting animals in previously tested herds, and the confirmation of reactions by post-mortem examination of slaughtered reacting animals to the extent of 97.78 per cent. The results of these tests are shown by the following table:

Results of tuberculin testing of dairy cattle in Virginia and Maryland, fiscal year 1912.

Item.	Number tested.	Number passed.	Number reacted.	Number of suspects.	Percentage of reactors and suspects.
Virginia:					
Cattle not previously tested	2,799	2,315	462	22	17.29
Annual retests	2,716	2,634	77	5	3.02
Total	5,515	4,949	539	27	10.26
Maryland:					
Cattle not previously tested	649	510	126	13	21.42
Annual retests	879	847	28	4	3.64
Total	1,528	1,357	154	17	11.19
Cattle not previously tested, both States	3,448	2,825	588	35	18.07
Annual retests, both States	3,595	3,481	105	9	3.17
Total, both States	7,043	6,306	693	44	10.46

This work has demonstrated a fact of great economic value to many herd owners, for together with the marked decrease in the per cent of tuberculosis disclosed by annual retests there has resulted a large number of entire herds which are now being maintained free from tuberculosis.

TUBERCULIN TESTING OF CATTLE IN THE DISTRICT OF COLUMBIA.

The eradication of bovine tuberculosis from the District of Columbia, which was begun in the fall of 1909 in cooperation with the Commissioners of the District, has been continued throughout the fiscal year 1912 by the systematic retesting of cattle within the area and the testing of cattle brought into the District from the various States for dairy or breeding purposes. The actual progress which has been made by the practical application and enforcement of the regulations and the use of specially trained veterinarians in the work, as herein shown, should serve as a stimulus to the tuberculosis eradication work in restricted and quarantined areas, and the possibility of successfully conducting such work in connection with city or town milk supplies can be recognized by a comparison of the results of the first systematic testing of all cattle in the District of Columbia with those of the retests now in progress.

During the past fiscal year 773 cattle in the District of Columbia were submitted to an annual retest. Of this number 763 passed, 8 reacted, and 2 were regarded as suspicious. These figures when compared with the results of the first testing of cattle throughout the District show that the percentage of cattle free from tuberculosis has been increased from 81.13 to 98.71 per cent, while the percentage of reactors and suspects has been reduced from 18.87 to 1.29 per cent. Furthermore, the percentage of infected premises demonstrated by the first test was 18.35, while during the past year but 3.61 per cent of the premises upon which retests were applied were found to be infected.

The maintenance of such a low percentage of tuberculosis among cattle in the District of Columbia is assisted by the caution with which District owners purchase cattle from adjoining States, many of the centers of infection having been disclosed by the results of the tuberculin tests in the previous year. The sale of cattle from these known infected herds has been practically stopped, as when reactors are found among cattle brought into the District no reimbursement is allowed, and the owners receive only the proceeds of the sale of those carcasses which pass the post-mortem examination after being slaughtered, as required by the order of the commissioners.

There were entered into the District for dairy or breeding purposes during the year 617 cattle, of which 595 were regarded as free from tuberculosis, while 21 reacted, and 1 was regarded as suspicious. This shows a percentage of reactors and suspects of 3.57, which should be compared with the results of original tests in Virginia and Maryland, where 18.07 per cent reacted.

Under the provision requiring the identification and tagging of cows and bulls entering the District for slaughter purposes, 827 tags were attached for 33 shippers.

The following is a summary of all tuberculin tests applied in connection with bovine tuberculosis in the District of Columbia during the fiscal year:

Total number of cattle tested	1,390
Number passed	1,358
Number reacting and suspected	32
Percentage of reactors and suspects	2.30
Reactions confirmed by post-mortem examination ... per cent	100.00

ACCURACY OF THE TUBERCULIN TEST.

The accuracy of the tuberculin test is shown by the results of post-mortem examinations covering a period of five years, extending from 1907, during which time tests were applied under varying weather conditions by a number of different inspectors, under the supervision of the Quarantine Division, working in Virginia, Maryland, and the District of Columbia. Out of 1,906 reacting cattle slaughtered and examined post-mortem, the lesions of tuberculosis were demonstrated in all but 41, thus confirming the tuberculin test in 97.85 per cent of the cases.

COOPERATIVE TUBERCULOSIS INVESTIGATIONS IN UTAH.

The cooperative tuberculosis investigations in Utah were inaugurated August 29, 1909. As a result of the first investigations it was found that in the majority of instances the infection of native cattle could be traced to eastern cattle which had been brought into the State for the purpose of improving the quality of its breeding stock. The infection was found to be most prevalent among dairies supplying large cities with milk, while in other sections the percentage of tuberculosis was much smaller.

The results obtained by the tuberculin test applied from October 29, 1909, to the end of that fiscal year, June 30, 1910, showed the presence of 5.3 per cent of tuberculosis among 5,989 cattle tested. During the past year tests were applied to 6,676 cattle, of which 72 reacted to the test, reducing the percentage of tuberculosis to 1.1 per cent.

The greatest amount of tuberculosis was found among the dairies supplying milk to Salt Lake City, and as a result of the first test, which was applied to 1,271 cattle found in these dairies, 9.44 per cent were classified as tuberculous. On the last retest, at which time the 55 dairies supplying Salt Lake City contained 1,304 cattle, the percentage of tuberculosis showed a reduction to 1.99 per cent.

COOPERATIVE TUBERCULOSIS INVESTIGATIONS IN INDIANA AND OHIO.

During the past year cooperative tuberculosis investigations have been conducted from the Cincinnati (Ohio) station of the bureau, in cooperation with the States of Indiana and Ohio, with the Cincinnati Medical Society Milk Commission in testing herds for the producton of certified milk, and with the director of public safety of Cincinnati, under whose control are the herds which supply milk to the city institutions. The work has not been in progress long enough to include a large number of animals, the total number of tests being 3,074. It will be seen, however, from the following table, which summarizes the work already done, that the percentage of reactors is quite low in all cases and is only comparatively high with the cows supplying milk to the city of Cincinnati.

Results of tuberculin tests of dairy cattle in Indiana and Ohio.

In cooperation with—	Tested and retested.	Passed.	Reacted.	Suspicious.	Per cent of reactors and suspects.
State of Indiana	1,074	1,053	13	8	1.96
State of Ohio	128	124	4		3.12
Milk commission	1,590	1,558	27	5	2.01
City of Cincinnati	282	266	16		5.67
Total	3,074	3,001	60	13	2.37

ERADICATION OF DOURINE.

During the past fiscal year the bureau has continued cooperative work with the State of Iowa in eradicating dourine (maladie du coït), which was discovered in the early summer of 1911 in a circumscribed area of that State.

During the year 16 affected horses were slaughtered under bureau supervision and the owners granted indemnity, the total expense incidental to the purchase and destruction of the same being $1,365. Frequent inspections have been made in the above-mentioned area by bureau inspectors, and at the close of the fiscal year 100 stallions and mares showing no indications of disease were being held in quarantine by the Iowa State authorities on account of exposure to the infection.

THE PATHOLOGICAL DIVISION.

The work of the Pathological Division, of which Dr. John R. Mohler is the chief, has continued to consist principally of the scientific investigation of animal diseases. Among those affections which have received the greatest consideration may be mentioned the following:

INFECTIOUS ABORTION.

In reviewing the veterinary field covered during the past year the particular event which indicates marked progress in the study of animal diseases is the work on infectious abortion that is being conducted in this and other countries.

From the viewpoint of economic importance infectious abortion of cattle ranks second only to tuberculosis, and in certain sections of the country even supersedes the latter in the monetary loss it occasions. Aside from the loss of the calf the loss occasioned by the reduction in milk supply, together with the failure to conceive for several months or forever after the abortion and the frequency of retained placenta, has made this disease the bane of dairymen and stock raisers.

The exact financial loss can not be even approximately estimated, but from the fact that the disease exists in all sections of the country, in both dairy and range cattle, as is evidenced by the reports from various State officials and from the inquiries received at the bureau regarding this disease, it can be safely stated that the direct loss reaches into the millions, while the potential loss is enormous and practically inestimable. Furthermore, the disease may be brought into a herd by an unsuspected animal and spread rapidly to other individuals without attracting attention, inasmuch as there are no readily noted symptoms present in the diseased animals.

While the bureau has for several years concerned itself with the general problem of infectious abortion in cattle, a few important phases have been more extensively studied during the past year, and even though many of the problems remain unsolved and some experiments are as yet not finished, still some valuable data have been obtained. Probably the most important and comprehensive facts which have been demonstrated in connection with this disease are (1) the discovery that the abortion bacillus is eliminated with the milk of the infected cow, and (2) that this bacillus is found in the tonsils of children, presumably as a result of drinking such infected milk.

At the meeting of the American Veterinary Medical Association in Toronto in the summer of 1911, Schroeder and Cotton, of the Experiment Station of this bureau, presented a paper on a bacillus which they obtained from milk and which was capable of producing tubercular-like lesions in guinea pigs. The name of "Bacillus 637" was given to the organism, as the first cow found secreting such contaminated milk was No. 637. A comparison of this organism with *Bacillus abortus* demonstrated conclusively that they were identical. Not only was this proof obtained by a study of morphology, biological characteristics, and pathogenicity, but the identity of the organisms was further established by the complement-fixation test on serum from animals affected naturally and artificially with infectious abortion in which both the 637 and abortion bacilli were used separately as antigens.

The frequency of the presence of *Bacillus abortus* in a food product like milk, and the ability of the organisms to produce lesions in guinea pigs, pregnant cows, and other animals led at once to the thought that *Bacillus abortus* might prove pathogenic for human beings. As a result our endeavors were directed along three lines; one was to obtain sera promiscuously from human beings and in case of positive reaction to learn more about the history of the individual whose serum showed the reaction; the second was to obtain samples of milk from women in order to examine it for the abortion bacillus, and third to obtain tonsils from milk-consuming children at the various children's hospitals and inoculate such material into guinea pigs. Material for these lines of work was not forthcoming as fast as desired. Out of 25 sera from human beings no positive results were obtained by either the complement-fixation or agglutination tests, although in similar tests made by Larson 3 out of 100 specimens of sera gave positive results. No samples of human milk have thus far been obtained. Out of 28 tonsils and adenoids inoculated into guinea pigs, tonsil No. 3 produced necrotic areas in the liver, but cultures from this organ remained sterile. Tonsils from case No. 8 inoculated into two guinea pigs showed in one of them after three months distinct lesions of infection in the liver, spleen, and testicles, and *Bacillus abortus* was obtained from the lesions.

The pathogenicity of this organism for white mice, white rats, chickens, kittens, and dogs was sought for with varying results.

Some strains would kill white mice with septicemia within 48 hours, when others failed to do so, but would produce necrotic areas in the liver and spleen within two and one-half months, while still others would fail to produce any lesions at all in these animals. The difference in pathogenicity was not alone noticed in different strains of *Bacillus abortus* in these and other animals, but also in the same strain but of a different generation, the organism losing its pathogenicity with life on artificial media. Kittens and dogs are still under observation, the first batch of kittens used dying within three weeks with enlarged and hemorrhagic spleens and waxy livers, but in these cases the organism has not as yet been recovered. Chickens have only in one instance shown small necrotic foci and petechial spots in the liver as a result of feeding cultures of *Bacillus abortus*.

Continued efforts were directed toward obtaining a biologic product which would prevent abortion in already pregnant animals and also in animals about to be bred. Observations up to date do not warrant the drawing of any definite conclusions. Over 250 head of cattle have been thus treated three or four times, and only a very small portion of this number have as yet calved. In a small herd treated early in this work the results were not encouraging, but failure in those cases may be attributed to the facts that a very thin suspension of bacterin had been injected, and, secondly, just one strain had been used in the preparation of the bacterins. Since the different strains have been found to vary somewhat, subsequent experiments have been conducted with denser suspensions made from a number of our most virulent strains, and the preliminary results thus far obtained with these injected cattle have been more satisfactory. For a more definite decision on the value of this line of vaccination the results of the treatment of the latter animals must be awaited.

Besides the above-mentioned work the diagnosis of the disease by the complement-fixation and agglutination tests has been successfully carried out on over 400 cases with satisfactory results. Studies are also being conducted with reference to the immunizing effect which infected milk from a " bacillus-carrier " mother will have upon the calf when it becomes adult.

FORAGE POISONING OR CEREBROSPINAL MENINGITIS.

The etiology of the disease variously known as forage poisoning, cerebrospinal meningitis, staggers, etc., being yet of such an obscure and puzzling nature, an attempt was made to learn more of a practical character in connection with the disease when occasion permitted. As it is such a very serious and fatal malady, the solution of the various questions connected with it is extremely important.

From numerous letters received during the months from November until July relative to the death of horses and cattle from eating moldy corn and fodder it is apparent that forage poisoning exacted a heavy toll during the past year. These letters were received from Pennsylvania, Maryland, Virginia, West Virginia, Kentucky, Missouri, Kansas, and south into Oklahoma. In fact, letters of inquiry were occasionally received from throughout all of the corn States The present year has seemed to be an especially bad year all through that section on account of the very dry summer being followed by a wet, warm fall, which is conducive to the development of molds and fermentation of the grain while in shocks in the fields. Again, reports have come from eastern Oregon, in a vast wheat-growing section, of a like disease affecting the horses except that it is of a much more chronic type. The nature of this disease is evidently very closely allied to that found in the corn-growing States, as brain tissues from affected horses in Virginia and Oregon showed practically the same macroscopic and microscopic appearances.

Since the close of the fiscal year covered by this report the disease has appeared extensively in Kansas, Nebraska, and adjoining States, but it has now subsided. The bureau rendered assistance by sending 20 veterinarians to investigate the disease and advise the farmers.

On account of the possibility of the identity of the disease in this country with the Borna disease of Germany, an endeavor was made to demonstrate the presence in this disease of the so-called intranuclear bodies lately described by Joest, of Germany, but these could not be found.

A significant fact in the bacteriological study of several brains showing well-defined lesions has been the isolation of microorganisms which bear a remarkable similarity both morphologically and culturally to the diplococcus described by Johne as being present in the Borna disease. But the organism with which we have dealt has never shown any tendency to grow in chains as do the streptococci isolated by Ostertag, and therefore the resemblance is closer to the coccus described by Siedamgrotzky and Schlegel as being the cause of the Borna disease, which these authors claim is a serious cerebrospinal meningitis. In the cases so far examined bacteriologically the diplococci have usually been found accompanied by some other bacteria, but the diplococci, although very few in number, have always been the preponderant organism.

Pathogenic properties have not been shown by inoculations made on experiment animals. It is possible that all of these organisms represent an agonal invasion from the intestines and have no causal connection with the disease. In connection with the coccoid organisms it may be noted that from the number of affections of the horse produced by them this animal appears to be peculiarly susceptible to their action.

On account of the very old and very plausible theory so often advanced that the disease is due to toxic substances existing in damaged grain and fodder, a number of species of fungi were isolated from damaged corn and grown on a sterilized corn medium in an effort to produce some toxic substance that would create disease when fed to horses. The fungus in pure culture was allowed to grow, for periods of about one-month's duration, in flasks containing 250 c. c. of the nutrient medium, and the contents of a flask were fed each day for a period of 30 days along with a sufficient quantity of sound corn and hay to make a normal ration, but no symptoms developed in the experiment animals.

It is possible that laboratory conditions alone can not be made to parallel sufficiently closely those which exist naturally in the growing plants, and that toxic substances which might be produced in a natural state could not be generated in a corn-meal medium in the laboratory. The by-products of the growth of both fungus and bacteria on corn and fodder should certainly receive more consideration in future work. To conduct an ideal experiment along this line it would seem necessary to engender whatever toxic substance may be formed in diseased corn by inoculating growing or maturing corn with known varieties of fungus, to feed this diseased corn to horses under the same conditions that check horses receive normal grain, and take note of any difference in its effects on the animals.

The evidence brought forth this year in the letters received at the bureau seems to indicate more strongly than ever that the trouble lies in the feeding of diseased and damaged feed, but why it should attack a number of horses in a particular stable practically within the space of a few days does not seem clear. In this respect the disease acts more like a malady generated by infectious microorganisms as distinguished from the disease-producing microparasitic organisms of plants. It would not be strange, though, to find that organisms parasitic to plants are also parasitic to animals, as their manner of action in the vegetable and animal kingdoms are closely allied.

In advising means of relief it was insisted upon that the first and principal measure to adopt was to make a complete change of feed and water, both to be procured from unquestionably pure sources. Cleansing and disinfecting the stables was advised. These measures when faithfully carried out absolutely check the development of additional cases of the disease upon the affected premises.

MYCOTIC STOMATITIS.

Reports of a disease which very closely resembled foot-and-mouth disease of cattle, and which for that reason caused considerable alarm among cattle owners, have reached this bureau, coming at first from Florida, Georgia, South and North Carolina, and later from Virginia, West Virginia, Maryland, and Tennessee.

In order that no infectious malady like foot-and-mouth disease should be permitted to become established and scattered, veterinary inspectors of the bureau who assisted in the eradication of the plague from Pennsylvania and New York in 1908 were detailed to investigate several of the outbreaks which had appeared among the cattle in the South. They found that the disease was due to eating moldy forage; that it was not contagious; that hogs running with the diseased cattle did not become affected; that only a small portion of the cattle in the herd developed the disease; and, finally, that the vesicles which are so characteristic of foot-and-mouth disease failed to appear in any of the animals. Complete information regarding the nature, cause, and treatment of this disease is contained in Bureau of Animal Industry Circular 51.

SWAMP FEVER.

The experiments of the past year have substantiated the fact that an immunity against swamp fever exists in some horses, and that this may be largely increased by means of successive injections of virus, each larger than the preceding. During the year four horses have received and withstood intravenous injections of virus which were sufficient in each case to have killed a large number of nonimmune animals. In a case of natural infection, which was obtained from the field and used in experiments during the year, remarkable and unexpected improvement was gained. Observations from this case suggested an experiment in treatment which is now under way, but which has not progressed far enough to furnish any definite conclusions. Experiments for the purpose of discovering some reliable means of diagnosis, especially modifications of the complement-fixation test, have been continued throughout the year, but without satisfactory results.

The fact that the virus from swamp fever will pass through filter tubes which are capable of excluding all visible contaminating organisms suggested that this process might be a means of isolating and possibly of cultivating the virus. It seemed reasonable to assume that the virus might be cultivated in infected serum which had been filtered, inasmuch as it would thus remain in the same medium in which it had developed during its life in the body of the animal from which the blood was drawn. Repeated incubations of such material for various periods under both aerobic and anaerobic conditions have failed to produce any evidences of growth which could be detected by the usual methods of microscopic examination. The failure of these cultures to grow proves that the virus can not be cultivated by the usual bacteriological methods. However, the certainty of the presence of the virus in the filtered serum and the fact that it can survive for some time in serum from which all contaminating elements have been removed afford encouragement to further efforts at cultivation.

DOURINE.

The reappearance of dourine of horses in the United States was brought to the attention of the bureau by State Veterinarian Gibson, of Iowa, in 1911, when members of the bureau confirmed its existence in that State by clinical and microscopic examinations. All the affected and exposed animals were either killed or quarantined, but not before several exposed animals had been shipped to Texas, Arkansas, and North Dakota, to which States they were readily traced and disposed of according to the conditions found. Two exposed stallions were taken to Canada before the disease was recognized, and these animals also were killed. Extensive examinations of all cases which had been bred to infected animals were carefully made, and the results indicated a comparatively limited dissemination of the infection.

The chronic character of the disease and the fact that affected animals may show no indications of the infection for a long period make its diagnosis very difficult; consequently suspected animals must be placed under a prolonged quarantine.

Following the success in diagnosing various infectious diseases by the complement-fixation test, the possibility of the application of this method for the diagnosis of dourine has been carefully considered by the bureau. The numerous attempts which were first undertaken were not successful, due to the difficulty of obtaining a satisfactory antigen for the test. The blood, organ extracts, bone marrow, etc., of affected animals were utilized for the preparation of antigen, but without uniform satisfaction. While still working with these various antigens the results of the investigations of Winkler became known. His studies showed the possibility of utilizing an antigen from another trypanosomiasis than dourine, nagana in this instance, thus indicating that the complement fixation in trypanosome affections represents a group reaction. Knowing the great abundance of trypanosomes in experimental rats affected with surra, a culture of *Trypanosoma evansi* was obtained through the courtesy of Prof. Novy, of the University of Michigan, and injected into a number of white rats. After four or five days, when the disease was at its height, the rats were bled to death, and as an antigen a shake extract was prepared from the blood and the macerated spleen. The preliminary tests with this antigen were very encouraging, as the sera of the dourine horses at the Bethesda Experiment Station and the sera of surra rabbits during both the febrile and afebrile periods gave in all instances excellent fixation.

The smallest quantity of dourine serum which gave a positive reaction proved to be 0.05 cubic centimeter; the positive tests showed that even a fixation in 0.2 cubic centimeter of serum is sufficient for diagnostic purposes. Sera from normal animals, also those affected with various other diseases, failed to give a reaction. Incidentally it may be mentioned that the sera from three swamp-fever cases were tested with negative results, thus further proving that the cause of that disease is not a trypanosome. The antigen was used in dilutions of 1 to 10 and retained its effectiveness for three months after its preparation. The ease with which an affirmative diagnosis of dourine may be obtained with this test is not to be compared with the arduous task which is necessary to determine the presence of the causative trypanosomes microscopically.

The possibility of utilizing the complement-fixation test for the diagnosis of dourine is of great moment in the control of the disease. By this means it is possible to determine all infected animals within a short time and dispose of them by methods best suited for the control of the disease. Furthermore, the introduction of the disease into the country could also be guarded against by a compulsory requirement of this test on all horses imported from countries in which dourine is present.

Since the foregoing was written the value of this method of diagnosis for dourine has been well illustrated. Late in June Dr. Knowles, State veterinarian of Montana, wrote the bureau to the effect that there were suspicious cases of dourine in eastern Montana, and requested that an expert be detailed to make a diagnosis. Owing to the impossibility of complying with this request a telegram was forwarded asking for blood sera from the suspected animals. This arrived on July 22 in excellent condition, and on the following day the complement-fixation test showed that four of the five samples gave a positive reaction.

GLANDERS.

The determination of occult and latent cases of glanders in horses and the necessity of an early diagnosis in these animals are of great importance, and therefore experiments have been conducted on an extensive scale in many laboratories in order to determine the most reliable method by which such cases may be diagnosed. Following the splendid results which were obtained in Germany by the combined complement-fixation and agglutination tests for the diagnosis of glanders, this method has been adopted by many laboratory workers and has proved very satisfactory. Samples of sera have been forwarded for diagnosis to the bureau laboratory from all over the United States, and they have become so numerous that it has become necessary to place restrictions on the work. It is regrettable that we do not always receive the post-mortem findings in cases which are diagnosed as positive by this method, but judging from the instances in which the autopsy findings have been reported, the combined tests appear to be accurate in over 98 per cent of the cases. In all more than 3.200 animals have been tested by this method. and the bureau is encouraging the State as well as the municipal authorities to adopt this method of diagnosis, which at the present time is undoubtedly the most accurate laboratory test at our command for the determination of the disease.

Such tests, of course, will always continue to be strictly confined to well-equipped laboratories. and therefore it is desirable to establish a method of diagnosis for glanders which could be undertaken by the practicing veterinarian and which at the same time would be more accurate than the subcutaneous mallein test. The favorable reports of results obtained from the ophthalmic reaction in the diagnosis of glanders in Europe suggested the application of this test in order to determine its accuracy. This method is followed extensively in Austria and constitutes the official test of that country. The European investigators suggested for use in these tests either the "mallein brut," which is a concentrated form of the ordinary mallein, or a 5 per cent watery suspension of the alcoholic precipitate of this product. In the work of the bureau the mallein has been prepared by concentrating the mallein used for the subcutaneous tests to one-tenth of its original volume without the addition of glycerin or carbolic acid. The application of the mallein into the eye is made with the aid of a camel's-hair brush. After sterilizing the brush, it is dipped into the mallein, the eye being opened in the manner practiced in the examination of the conjunctiva, and the brush is drawn once forward and backward over the eye. The application is made into one eye only, while the other is used as a check. The test should not be undertaken in the presence of any inflammatory conditions in the eye. Twenty hours subsequent to the application of the mallein to the eye the reaction is read. The presence of a purulent discharge together with conjunctivitis indicates the presence of the disease.

In most instances the reaction is very prominent and may be recognized at a glance.

The results obtained by this test have proved very encouraging and highly satisfactory. In all positive cases the reaction was very pronounced and the presence of the disease confirmed by autopsies, while negative cases controlled by the agglutination-fixation test showed no reaction whatsoever. The test in our hands has been found to be superior to the subcutaneous mallein test, and has, besides, the advantage that after the application of the mallein into the eye it is only necessary to examine the animals about 20 hours subsequent to the administration.

TETANUS.

With the discovery of the cause of tetanus by Nicolaier in 1884 and the successful experiments on immunization by Kitasato and Von Behring in 1890, a wonderful advance was made in our knowledge of the disease. This fundamental information enabled investigators to apply themselves to a line of study which resulted in the comprehensive knowledge now at our command concerning the pathogenesis of the affection. The practicing veterinarian has no longer to fear the development of this dreaded disease subsequent to operative or traumatic wounds, as he is assured protection for his patients by the injection of a preventive dose of tetanus antitoxin. It is regrettable. however, that this method of prophylaxis, which to-day is probably the most certain in preventive medicine, is not used to a more general extent, especially in localities where the disease is very prevalent.

In a series of experiments on horses recently undertaken by the bureau it was aimed to establish the smallest quantity of antitoxin—that is, the minimum number of units—which would protect a horse against a positive infection of tetanus. The preliminary experiments were carried out on guinea pigs, and after establishing the best procedure of introducing the infection into the system, experiments were undertaken on horses. The animals were infected with the pure cultures of tetanus spores and bacilli from which the toxins were eliminated by either washing the cultures or heating to 75° C. for 45 minutes. In infecting the horses the natural modes of infection were followed as closely as possible. Thus the virus was introduced in artificially-punctured wounds of the foot, into bruised, lacerated, traumatic wounds of the body, into the scrotum, etc. In all instances a small quantity of sterilized dirt was mixed with the culture, which was found in the preliminary experiments on guinea pigs to be essential in producing a positive fatal infection. After infecting the horses, each animal after varying lengths of time received subcutaneous injections of antitoxin in varying quantities.

The results showed that 500 units of tetanus antitoxin injected even 96 hours subsequent to the infection will protect an animal against the disease. In no instance did any signs of tetanus develop in the animals after receiving over 400 units of antitoxin, while the animal used for a check and those receiving very small quantities of antitoxin succumbed to the artificial infection. Symptoms of localized tetanus developed in the horses which received 250 and 400 units, but even these animals recovered.

In consideration of the fact that all the horses used in these tests were quite aged and accordingly not nearly so susceptible as young animals, a somewhat larger quantity of antitoxin would be necessary to prevent absolutely the development of tetanus in the latter animals. Accordingly 500 units would seem to be sufficient for the prevention of tetanus in horses of any age. These results are of great interest when it is considered that the cost of the antitoxin for immunization can be greatly diminished by employing with safety only one-third of the quantity of antitoxin which is now being used for protective purposes.

In these experiments it will be observed that the antitoxin was employed at different periods subsequent to the infection, and the results obtained indicate that the administration of the antitoxin even 96 hours after the infection will prevent the development of the disease. This is of considerable practical importance, inasmuch as frequently the veterinarian is called to attend to an injured animal only after a considerable time has elapsed following the injury.

Dr. A. P. Hitchens (American Veterinary Review, Vol. XXXVII, p. 597), who carried out similar experiments on horses, failed to notice the development of any symptoms of the disease in the animals receiving more than 100 units. While the neutralization of the developing toxin may take place from such small quantities of antitoxin if injected early enough after the infection, it might not be entirely safe to use such a small dosage of antitoxin when it is injected after a longer period than one day following the infection.

From the results of these two investigations it may therefore be concluded that 500 American units is a sufficient dose of antitoxin for use as a prophylactic, even in cases where the infection has occurred four days prior to the injection of the antitoxin.

MALTA FEVER.

By the recent investigations of Gentry and Ferenbaugh, of the Medical Corps, United States Army, the existence of malta fever in Texas has been definitely established. Its occurrence in human beings has been demonstrated bacteriologically among certain families in the goat-raising sections of Texas, and since goats have been incriminated as carriers of the infection to man, the sera of a number of these animals in the infected localities were subjected to the agglutination test with positive results. The isolation of the *Micrococcus melitensis* from these goats was not successful, and the agglutination test was therefore relied upon for the diagnosis of malta faver in these animals. The occurrence of the disease in Texas has been substantiated by Mohler and Eichhorn, of this bureau, who obtained positive results not only with the agglutination test, but also with the complement-fixation test of sera from goats sent to the laboratories at Washington from the infected localities of Texas and New Mexico.

The existence of this disease in Texas and New Mexico is of great moment, inasmuch as the general opinion has prevailed that the United States is free of malta fever, and that the only occasions when the disease has appeared in this country were isolated instances occurring through importation. However, from a careful investigation in the infected districts it seems evident that malta fever, which is also known locally as mountain fever and slow typhoid fever, has existed in Texas and New Mexico for at least 25 years; that the disease has always made its appearance among people connected with goat raising; that entire families have been taken sick with the disease on goat ranches; that many of the goat ranches have had one or more cases of the fever among the people connected with them; and that in some years there are numerous cases of the disease, while in other years only a few cases will appear. The affection appears usually after the kidding season, during the months of April, May, and June, when the people are in closer contact with the goats. It is stated that the Mexican goat herders are quite infrequently affected, but this may be due not to any natural immunity but to the fact that the Mexicans always boil the milk before drinking it, while the Americans use the milk raw. The origin of the disease in that section is indefinite, but it is claimed that the affection prevailed in Texas when the common goat was the only goat in the country and long before any of the fancy breeds of goats were imported from South Africa, where malta fever has been found to exist.

The infection of man is best guarded against by the pasteurization of all goats' milk and the removal of the corrals and kidding pens from proximity to dwellings. The sanitary conditions around goat ranches should be improved. The goat pens, as a rule, are very close to the houses, and the goat manure has been collecting in these pens ever since goats have been kept therein. Frequently the goat bedding ground is around the yard fence. The water supply is frequently from wells and small streams, and in many instances these may readily become contaminated from goat pens. In localities where the disease is prevalent an educational campaign dealing with the necessity of heating the milk, as is done for the prevention of typhoid from milk, would greatly aid in the prevention of the infection in man. Although the disease has no active effect on goats, which merely act as the passive carriers of the infection, eradication must be considered from the standpoint of public health, and in this respect it is of the highest importance, since there is a tendency at the present time among physicians to advise the drinking of goats' milk for children and invalids.

HEMORRHAGIC SEPTICEMIA AMONG BUFFALO IN YELLOWSTONE NATIONAL PARK.

During the month of December, 1911, the Department of Agriculture received information from the Department of the Interior of the existence of a fatal disease in the buffalo herd in the Yellowstone National Park, with the request that an expert be detailed to investigate the disease. Dr. E. J. Cary, a veterinary inspector of the bureau, was accordingly detailed to carry out the investigation at the park. In all, 22 buffaloes died between December 3 and December 15, young animals being especially victims of the disease. The symptoms and especially the post-mortem findings were indicative of hemorrhagic septicemia, but it was deemed advisable to forward some of the tissues to the laboratory at Washington for confirmation. The bacteriological examination as well as test inoculations proved an infection with hemorrhagic septicemia, as the specific microorganism, *Bacillus bipolaris bubalisepticus*, was isolated from all tissues, and test animals which were inoculated with material from the specimens died of typical hemorrhagic septicemia, the specific organism being also recovered from the blood of these animals.

The authorities of the park were immediately notified of the findings and preventive measures recommended for the checking of the spread of the disease. In consideration of the possibility of the recurrence of the infection in the spring it was deemed advisable to undertake in the early spring the vaccination of the entire herd with bacterial vaccines prepared from the recovered organism. For this purpose two vaccines were prepared of different strengths. The vaccine for the first inoculation was prepared by growing the organism five days at 42.5° C., while the vaccine for the second injection was cultivated in the same temperature for only two days.

In order to determine the efficiency of the vaccine it was deemed advisable to test its potency on experimental animals prior to the vaccination of the buffalo herd. Rabbits and sheep were employed for that purpose. Two subcutaneous injections of the vaccines were given to these animals at 10-day intervals, for the first vaccination the more attenuated and for the second vaccination the less attenuated vaccine being injected. The rabbits received 0.2 c. c. per injection, while the sheep were given 0.7 c. c. of each vaccine. On the sixth day following the second injection the animals were given a subcutaneous injection of the pure culture of the *Bacillus bipolaris bubalisepticus.* Likewise a rabbit and one sheep which had not been vaccinated were also injected with the pure culture of the organism, serving as controls. Neither the two vaccinated sheep nor the vaccinated rabbits developed any indications of the disease, only one sheep showing a slight elevation in temperature, which subsided after one day; on the other hand, the control animals succumbed to the disease.

After obtaining these favorable results the vaccine was sent to the veterinarian entrusted with the vaccination of the buffaloes, with instructions to vaccinate all animals of the herd by the same procedure at 10-day intervals. The dose for each animal was 1 c. c. of the vaccine. Following vaccination the herd was carefully observed, no immediate effects being noticed from the vaccination, and up to the present time there has been no indication of the recurrence of the disease among the buffaloes.

In the progress of the preparation of the vaccine, experiments were also conducted in the laboratory to determine whether the complement-fixation test could be applied for the diagnosis of the disease, and also for the purpose of determining the relative degree of immunity conferred on the vaccinated animals in artificial immunizations. An antigen was prepared from the original organism recovered from the outbreak among the buffaloes in the form of a shake extract. The hemolytic system consisted of sensitized rabbit serum (amboceptor), guinea-pig serum (complement), and washed-sheep corpuscles. The test was employed with sheep serum and rabbit serum of artificially infected animals, and the results proved entirely satisfactory. A complete fixation was obtained in all instances when applied to 0.1 c. c. of serum of infected animals, while the control showed no fixation whatsoever.

After the vaccination of the sheep and rabbits, blood serum was obtained from these animals and tested with the complement-fixation test. The results in these instances also showed a fixation of the complement, although not as complete as in the infected animals, nevertheless showing that the animals responded after vaccination with the production of immune bodies. This reaction has been noted even two months after the vaccination, and the testing of the blood will be continued from time to time in order to determine the length of the period in which the animals possess immune bodies subsequent to vaccination.

The utilization of the complement-fixation test in the diagnosis of of hemorrhagic septicemia, and also its value in determining the relative immunity established by vaccination, is of great importance, not alone in this disease but also by its possibility of utilization in other diseases.

RABIES.

During the year ending June 30, 1912, there were 183 animals, consisting of 150 dogs, 20 cats, 8 cattle, and 5 horses or mules, suspected of being affected with rabies, sent to the pathological laboratory that a definite diagnosis might be made. Of this number it was found that 93 dogs, 12 cats, 5 cattle, and 2 horses were rabid, as their brain tissues revealed the presence of Negri bodies when examined by means of the microscope. The origin of these rabid animals was as follows: District of Columbia, 56; Virginia, 23; Kentucky, 16; Maryland, 7; Tennessee, 7; and South Carolina, West Virginia, and Illinois, 1 each.

It will be noted from the foregoing that an unusually large proportion of rabid cats were received, 12 of these animals having reached the laboratory, together with 8 that were suspected of being affected.

BLACKLEG.

The preparation and the free distribution of blackleg vaccine have been continued during the past year, during which time 1,340,380 doses have been prepared in the laboratory and distributed among cattle raisers. With greater and improved facilities for the manufacture of vaccine we have been able to send out without delay a much larger supply of vaccine of uniform quality than heretofore.

The statistics of vaccinations for the fiscal year, as reported to the bureau by stock raisers who have used the vaccine, indicate that the same efficient results have been obtained as those reported for previous years, when the death rate showed a reduction to less than one-half of 1 per cent.

CHRONIC MASTITIS.

Recognizing the importance of tubercular and streptococcic mastitis, an investigation of 1,021 udders of cows was made for the purpose of ascertaining the proportion of diseased udders among them. These were divided into two lots. The first lot consisted of 521 nontuberculous cows, and the last of 500 cows which had been "retained" on the killing floor in the meat inspection for either very slight or extensive tubercular lesions.

Of the first lot, 38 of the udders were found diseased. All of these, with the exception of 1, contained pus, which was either confined to the large milk ducts or diffusely scattered through the organ. The one in which no pus was found contained a small growth in one hind quarter, which proved to be a carcinoma. The organisms which were found to be responsible for the lesions in the remaining 37 udders were as follows: Streptococci were found in 18, streptococci and staphylococci in 7, diplococci in 2, streptococci and *Bacillus pyocyaneus* in 7, and actinomyces in 3. A careful examination for tubercle bacilli was made in all, but none were found.

Of the 500 carcasses retained on the killing floor for tuberculosis, 35, or 7 per cent, of the udders were found to be diseased. Tubercle bacilli were found in 5.7 per cent of them, and actinomyces were found in 1. The remainder of the udders contained various pus-producing microorganisms in about the same proportions as the udders of the 521 nontuberculous carcasses.

CASEOUS LESIONS IN SUBMAXILLARY LYMPH NODES OF SWINE.

These lesions appear as very small caseous areas varying in size from one-eighth to one-fourth of an inch in diameter, and are white or greenish white in color, surrounded by a delicate fibrous capsule.

If slight pressure be applied the caseous material will separate easily from the capsule, leaving a comparatively smooth surface. This condition does not appear to be of a progressive nature, as only one submaxillary lymph node is found affected in the carcass and usually only one area in each node. Since these lesions resemble those of tuberculosis, it was decided to collect a sufficient number of the nodes showing typical lesions and inoculate guinea pigs with the caseous material to ascertain whether or not these lesions are of a tuberculous nature. In all, 31 lymph nodes from retained carcasses were collected and an equal number of guinea pigs injected. In each case where a specimen was selected the carcass was marked so that it could be identified in the retaining room; in no case were lesions found other than at the primary seat. Ten of the 31 guinea pigs died from sepsis a few days after inoculation. The remaining 21 lived a sufficient time to develop tuberculosis if tubercle bacilli were present in the material injected. On post-mortem one was found to be tuberculous.

EGG INVESTIGATIONS.

An investigation has been made of the frozen and desiccated egg industries with special reference to the bacterial content of the finished products and the sources of contamination. Eggs from healthy virgin pullets, whether recently laid or kept for six weeks in an ordinary clean condition, with or without refrigeration, were shown to be free from bacteria. Infertile eggs and supposedly fertile eggs from healthy hens were shown to be free from bacteria even when kept for several weeks in an ordinary clean condition and with usual housekeeping refrigeration. So-called "cracks," "seconds," and "borderline" eggs were shown not to be necessarily infected, as when broken under the strictly aseptic conditions of a bacteriological laboratory they proved to be free from bacteria. On the other hand large numbers of eggs from the classes just named, taken from current receipts and broken under the conditions usually prevailing in commercial houses, showed various degrees of bacterial contamination, apparently depending upon the nature of the surroundings, the character of handling, and the intelligence of the workers.

During the latter part of the year careful studies were made of freshly broken egg material at houses where work was conducted on lines of cleanliness and with proper application of bacteriological methods. After having established a remarkably low bacteriological content as obtainable under the usual conditions of breaking eggs in such houses, note was taken of frequent unexplainable rises in this bacterial content, which led to a careful research into the relation of so-called sour, musty, cloudy-white or green-white eggs to this high bacterial count in the broken-egg contents of jars and churns. As a result of this phase of the investigation it would appear, up to the present time, that in spite of the utmost cleanliness of workers, utensils, and surroundings, carefulness and celerity in handling, there frequently occurs a notably high count due to the introduction of affected eggs which had not degenerated enough to permit their detection by nose or eye as ordinarily trained. While trying to preserve all that has been secured in the way of sanitary methods, it is apparent that further studies are necessary to secure protection from the contaminated egg which at present can not be detected by sight or smell.

MILK HYGIENE.

During the past year an experiment was conducted in conjunction with the Pennsylvania State Live Stock Sanitary Board for the purpose of making a study of biochemic reactions of milk as compared with the bacterial count, and testing the practical application of these reactions. The biochemic reactions which were compared with the bacterial count were catalase, per cent of acid, reduction, fermentation, and the alcohol test.

It was found that the biochemic tests used were simple in their technique, and that by their application many pathological conditions could be detected which would materially aid in a clinical examination of a dairy herd. Various pathological secretions from the udder could often be detected, whereas a chemical and bacteriological examination frequently gave negative results. The tests if applied at the site of milk production would aid health officers in controlling their local milk supply.

At present an experiment is being conducted to compare the catalase test of individual cows kept under various conditions and receiving different kinds of feed. Most of the work done on catalase up to the present time has been on mixed milk from a diseased herd. The object of this work is to learn whether the catalase test can be applied to eliminate individually diseased cows from a herd. This last experiment is still in progress.

THE BIOCHEMIC DIVISION.

The work of the Biochemic Division, of which Dr. M. Dorset is chief, has consisted, as heretofore, of laboratory work incident to the meat inspection, laboratory research work relating to meat products, investigations concerning hog cholera, the examination and preparation of stock dips, and the preparation and distribution of tuberculin and mallein.

LABORATORY MEAT INSPECTION.

The laboratory inspection of meat and meat food products supplements the work of the veterinary inspectors and meat inspectors, and its chief function is to prevent the adulteration and mislabeling of products which bear the Federal inspection mark. Samples of all products prepared under inspection are collected and submitted to the laboratories by employees especially designated for this purpose. In addition, veterinary inspectors and meat inspectors, when they have reason to suspect adulteration of an article through the surreptitious use of prohibited substances, are enabled to retain the suspected product until a laboratory inspection has confirmed or disproved their suspicions.

During the fiscal year ending June 30, 1912, the laboratories examined a total of 26,889 different samples. These samples were of the most varied character, consisting of a wide variety of fats and oils, of prepared meats, cereals, gelatins, coloring matters, salt, sugar, saltpeter, spices, disinfectants, water, and rat and insect exterminators. The results show that no attempts are being made to use prohibited preservatives and coloring matters at establishments under Federal inspection. The condemnations which have resulted from laboratory inspection have been made, as in previous years, in the case of oils and fats chiefly on account of rancidity, and in the case of prepared meats chiefly on account of the employment of cereal substances without proper declaration on the label as required by the regulations. It is pleasing to report that the use of cereal in sausage without proper declaration has been much less frequent during the past fiscal year than in previous years. This is no doubt due to a more active and careful supervision of the preparation of sausages, brought about by orders from the chief of the bureau.

During the year a careful study was made of 330 samples of water. These samples were secured from a large number of different establishments throughout the country, inspectors having been instructed that samples must be forwarded to the laboratories for examination if there is any reason whatever to doubt the wholesomeness of the supply, as the department insists that water used in the preparation of meats and meat food products shall be of the same degree of purity as is required for drinking water. As a result of this work 11 sources of water supply in different parts of the country have been condemned and the proprietors of packing houses required to substitute more satisfactory supplies. The number of condemnations of water supplies during the past year is less than in previous years, although a considerably greater number of analyses were made. This indicates that the water supplies of packing houses are in better condition than ever before.

During the year 4,245 gallons of branding ink were prepared and shipped to inspectors in charge of meat inspection for use in applying the mark "U. S. inspected and passed" to meats which had been found to be sound, healthful, wholesome, and fit for human food, and in applying the mark "Inspected and condemned" to carcasses and parts which have been found to be unfit for food.

RESEARCH WORK REGARDING MEAT PRODUCTS AND EGGS.

Mr. W. B. Smith, in charge of the Kansas City laboratory, has acted as referee for the Association of Official Agricultural Chemists on methods for the analysis of meat and fish. He, with others in the division, carried out considerable work in this connection, and his report will be submitted to the association at its next meeting. The division has also cooperated with the referee on fats and oils of this association, and has made a considerable number of analyses of various proposed methods.

As the rules of the bureau require that the presence of cereal be shown when it is used in sausages, and as they require, furthermore, that when more than 5 per cent of cereal is used the label shall be modified so as to indicate to the purchaser a considerable proportion of cereal, it has been necessary for the laboratories not only to detect the presence of cereal but to estimate with exactness the amount employed. The methods heretofore recommended for the quantitative estimation of starch in meats, and particularly the so-called official methods of the Association of Official Agricultural Chemists, were found to be unsatisfactory, both on account of inexactness and of the very considerable time required for each analysis. Investigations were therefore undertaken with the idea of securing a reliable, accurate method which could be carried out with a minimum expenditure of time and labor. The result has been the elaboration by Dr. T. M. Price, in charge of the central meat-inspection laboratory, of a very satisfactory method for the estimation of starch in meat food products. This method combines certain features of methods heretofore proposed by others, and is to be especially recommended on account of the ease and rapidity with which starch determinations can be made. Bureau of Animal Industry Circular 203 describes the process in detail.

Very careful study has been given to methods for the quantitative estimation of arsenic in articles, such as coloring matters, which may be at times used as ingredients of meat food products. The result of this work has been to establish beyond question that very minute amounts of arsenic can be estimated with comparative certainty. The method, which will be described in a publication, is based upon a careful digestion of the sample with nitric and sulphuric acids and a final estimation of the amount of arsenic through the use of the Gutzeit apparatus. Articles which are found to contain more than 0.01 of a grain of arsenic (As_2O_3) per pound are not allowed to be used as ingredients in meat food products.

At various times during the year inspectors have forwarded for examination samples of stearin which appeared to be discolored from dirt. A careful examination has shown in practically all cases that the discoloration was due to the development of molds in the stearin. These molds produce pigments of a black or reddish color. Chemical examination of the moldy stearins showed that in all cases they contained a considerable amount of water, as much as 1 per cent being present in some cases. It seems that the loss to packers from the development of mold in stearin could be in great measure eliminated through a more careful preparation of the stearin so as to avoid the presence of moisture.

The study of different canned meats, which has been in progress now for several years, is being continued. The results thus far obtained do not warrant a report at this time. The work consists in making a thorough chemical, histological, and bacteriological study of the meats at regular intervals.

The cooperative study of commercial egg-packing plants, mentioned in my last report, was begun in July, 1911, the chemical side of the investigations being allotted to the Biochemic Division. Two experienced and practical chemists were assigned to the work, which was carried out chiefly in the laboratory in South Omaha, Nebr., by Messrs. E. A. Boyer and W. C. Powick.

The various egg-packing establishments in Omaha and South Omaha were visited and their methods studied, after which the principal plants in Atchison and Topeka, Kans.; Kansas City and St. Louis, Mo.; Chicago, Ill.; and Creston and Clarinda, Iowa, were similarly inspected. In this way the workers obtained a general familiarity with the practical methods of candling and grading eggs and of preparing egg products and a knowledge of the sanitary conditions under which the work was conducted.

The eggs are graded by "candling," a process by which the physical condition of an unopened egg may be judged by means of transmitted light. In this manner the eggs are sorted into the following grades: No. 1, practically fresh eggs; No. 2, slightly deteriorated eggs; "cracks" (eggs with unsound shell but unbroken membrane); "spots" (consisting of partially incubated eggs, eggs with yolk adhering to shell, leakers, etc.); "rots" (eggs in an advanced state of decomposition).

By careful candling these grades may be subdivided, and in the selecting of samples for chemical examination this was sometimes done. The first three grades are considered edible and the last grade inedible, by unanimous consent. As regards "spot" eggs, however, the opinion of packers seems to be divided.

In the chemical examination of eggs the line of work selected as promising the best criterion by which to judge of the relative deterioration of eggs and egg products was the study of their ammoniacal nitrogen content. Samples of the above-named grades of shell eggs and various samples of frozen and desiccated egg products were procured through the cooperation of establishments in Omaha and Topeka, while samples of strictly fresh eggs (less than 24 hours old) were obtained from neighboring poultry farms. The ammoniacal nitrogen content of these samples was determined by the Folin method, and the following average results, stated in milligrams of nitrogen per 100 grams of moisture and fat-free substance, were obtained:

Fresh eggs (less than 24 hours old)	6.071
No. 1	8.45
No. 2	11.28
Cracks	12.69
Spots	12.55 13.93
Rots	250.00

Eggs of known history:

1 day old	6.21
4 days old	9.22
6 days old	10.09
14 days old	12.37
28 days old	15.75
44 days old	19.13

It will thus be seen that with the increasing age of eggs, or their deterioration as judged by candling, there is a corresponding increase in their ammoniacal nitrogen content.

Now, it may be urged that such small amounts of ammoniacal nitrogen as were found in eggs are in no wise injurious, that it has not been shown that a high ammoniacal nitrogen content is proof of the presence of any other harmful decomposition product, and that therefore this determination can not be used as a means of judging the edibility or inedibility of eggs.

In the opinion of the workers, however, it appears that this argument by no means destroys the utility of the test, for by common consent there exists among consumers a physical standard for eggs, and the results obtained in these investigations have shown that eggs which are good from a physical standpoint are always lower in ammoniacal nitrogen content than is the case in those which are of a questionable character. Therefore it appears that the ammoniacal nitrogen test may be of much value in determining whether or not a given sample of eggs has undergone deterioration.

It should be noted, however, that while the amount of ammoniacal nitrogen present in a given sample of eggs may be taken as an index of age or of deterioration, there are such small differences apparently between the undoubtedly wholesome eggs, such as the No. 2 grade, and those which are generally regarded as inedible, such as "spots," that it would be difficult for a chemist, given a mixture consisting only in part of "spot" eggs, the remainder being of No. 1 or No. 2 grades, to detect the "spots" by analysis. It would therefore seem that preventive rather than corrective measures would be more likely to secure for the consumer a wholesome and properly prepared product.

Other lines of chemical work have been and are being carried out in connection with eggs, but the results have been unsatisfactory or are not yet complete, and are therefore not reported.

A large amount of time has been given to the study of various subjects of minor importance, as, for example, the composition of air-tight coverings for hams and bacon, methods for denaturing organs intended to be used for fish food, and various patented methods for cooking and curing meats.

DIPS AND DISINFECTANTS.

The examination of samples of dips, disinfectants, and more or less related materials submitted by manufacturers, bureau inspectors, and other Government officials has been continued as in the past. The concentrated dip prepared by the division for use in the work of tick eradication, which was mentioned in my last report, has continued to prove most satisfactory. It has not been the policy to encourage the use of this dip, but, nevertheless, in response to insistent demands a quantity sufficient to make 114,000 gallons of diluted bath was prepared and shipped during the year.

During the past year the entire time of two chemists and a part of the time of other employees has been devoted to the work of enforcing the insecticide act of 1910. By order of the Secretary of Agriculture, the bureau was directed to make the necessary examination of official samples of insecticides and fungicides intended to be used in preventing, destroying, repelling, or mitigating insects and fungi which may affect horses, cattle, sheep, swine, or goats. This has resulted in the examination of a great variety of products, which are mostly classified under the headings of coal-tar creosote and soap mixtures, lime and sulphur, nicotin solutions, tobacco extracts, soaps and ointments, various oily mixtures, and a number of special products too varied in character to be classified. In addition to the routine examination of these official samples, special lines of research have been necessary in prosecuting this work, as, for example, a study of the poisonous properties of various phenolic preparations, a study of the methods for determining sulphur in organic substances, and the elaboration of methods for the examination of insecticides in powder form. During the year 146 samples of articles which had been shipped in interstate commerce and 17 samples of imported insecticides were examined in accordance with the provisions of the insecticide act.

The study of the effect of the passage of sheep upon the composition of dipping fluids has been continued, and it has been clearly shown that both lime-sulphur and nicotin dipping fluids, as well as coal-tar creosote baths, suffer progressive diminution in the contained percentage of active ingredients through continued dipping. In the case of baths prepared from cresol dip the few results so far obtained are not decisive. Such a well-marked diminution in strength necessarily involves a certain degree, though not necessarily an equal degree, of impairment to the efficiency of these baths. It would appear, therefore, that eventually one of two courses must be adopted, either the bath must be renewed with a stronger solution than was originally employed or methods of assay must be developed sufficiently rapid and simple to permit frequent tests to be made by the men in charge of the vats.

Experiments previously projected to determine the degree of absorption and retention of arsenic by the various tissues of cattle dipped in arsenical solutions have been prosecuted to some extent. Decisive results involve more time and the killing of more cattle than has yet seemed advisable, but certain facts have been clearly established: (*a*) Arsenic is considerably absorbed and long retained by the skin of dipped animals, particularly in the deeper layer; (*b*) from the skin arsenic is partly absorbed into other tissues of the body and partly eliminated through the urine and the milk; (*c*) as respects the possibility that arsenic may be present in edible products derived from dipped animals, it is certain that continued dipping will introduce only traces in either muscular tissues or in milk. In the case of milk these traces only appear in the first few milkings after dipping. Somewhat larger amounts may accumulate in the liver and the kidneys. These organs, however, are eaten only occasionally, not daily, as is muscular tissue; hence there does not seem to be warrant for apprehension that arsenical poisoning or impairment of health may result from the use of food products derived from dipped animals.

At a suggestion from one of the field agents of the bureau in the first part of the year, efforts were made to develop a simple method for testing arsenical solutions adapted for use in the field. A method that seemed promising having been devised, two experimental outfits were prepared and sent out in the field for trial. A large number of samples of baths in actual use were examined by various employees in the field and the results forwarded to the laboratory, together with a sample of the dips themselves, so that the accuracy of the field tests could be determined by laboratory analysis. The results showed that the method, while of course not yielding figures as highly accurate as would be obtained in a fully equipped chemical laboratory, was very satisfactory from a practical point of view. They also showed very plainly the pressing need for some test of the sort, since a large proportion of the samples contained a percentage of arsenic much different from that supposed to be present, usually less. These outfits are being supplied to the field men.

Occasioned by the necessity for analyzing mercuric chlorid tablets used in large quantities by the inspection service of the bureau, a study has been made of some methods for the analysis of such tablets and a paper prepared, as yet unpublished.

HOG-CHOLERA INVESTIGATIONS.

In my last report it was stated that an investigation of the effect of phenol, thymol, and formaldehyde upon the virus of hog cholera had been begun. It was also reported that a study of the immunity possessed by the offspring of immune animals was likewise being continued. A brief report of the progress in these two lines of investigation will now be presented, and certain other work which was begun subsequent to the last annual report will be described.

PRESERVATION OF HOG-CHOLERA VIRUS BY MEANS OF CHEMICALS.

It is very desirable to be able to preserve hog-cholera virus by means of chemicals without reducing its virulence. What is needed is an antiseptic that will destroy all adventitious organisms without affecting materially the virulence of the filterable virus of hog cholera. The antiseptics employed in the experiments were phenol, formaldehyde, and thymol.

I have previously reported that phenol could be added to the defibrinated blood from hogs sick of hog cholera and containing the virus of the disease without materially affecting the virus. Further experiments have shown that a 1 per cent solution of phenol does not destroy the virulence of hog-cholera blood after a contact of four weeks, the preserved virus being kept during this time at a temperature of 6° C. Pathogenic bacteria, such *Bacillus suipestifer*, which are frequently found in the blood of sick hogs, were in all cases destroyed at the end of two weeks, and generally very much sooner, by 1 per cent of phenol. Simultaneous inoculations made by the use of serum with virus containing 1 per cent of phenol appear to confer an immunity which is quite as lasting as that secured when the uncarbolized virulent blood is employed with the serum.

Formaldehyde in the proportion of 1 to 10,000 and 1 to 12,000 (equivalent to approximately 1 to 4,000 and 1 to 5,000, respectively, of the ordinary 40 per cent aqueous solution of formaldehyde) was found to destroy all of the ordinary bacteria in the virulent defibrinated blood within two weeks, although the virus of hog cholera appeared to be unaffected even after four weeks' contact. All specimens were preserved during the experimental period at a temperature of 6° C. No simultaneous inoculations were carried out with formalized blood.

Thymol was employed, as a rule, by adding one-half gram of the thymol crystals to 100 cubic centimeters of blood. The thymol did not appear to be as effective as either phenol or formaldehyde in destroying the ordinary bacteria found in blood taken from sick hogs, though usually at the end of four weeks the virulent blood to which thymol had been added was found to be free from visible bacteria. The thymol did not appear to have any noticeable effect upon the virulence of the hog-cholera virus.

Of the three preservatives the 1 per cent solution of phenol appears to be the most effective as a preservative agent, and is therefore the substance best suited for preserving virus for simultaneous inoculations. On the other hand, however, the phenol is, of course, quite toxic, and for this reason can not be used to preserve large amounts of virus which are to be used later for hyperimmunization. In the process of hyperimmunization such large amounts of defibrinated virulent blood must be injected that phenol can not be considered, owing to the fact that the injected hog would almost certainly be fatally poisoned by it. We have, however, employed certain lots of virus preserved with thymol and with formaldehyde for hyperimmunization, as follows:

Ten different lots of disease-producing blood were preserved with one or the other of these disinfectants, and immune hogs were given hyperimmunizing doses, usually by the intravenous method, after the disinfectants had been in contact with the blood for from one to three weeks. The formalized disease-producing blood, when injected intravenously in the usual dose for hyperimmunization (that is, 500 cubic centimeters per hundred pounds, body weight), was without visible effect upon the hog, but the blood containing thymol, injected in the same manner and in the same amount, proved to be distinctly toxic. When employing the thymolized blood it was frequently noticed that during the intravenous injection of such blood the hog would cease breathing and in most cases would undoubtedly have died except for the employment of artificial respiration. By great care in administration and in treatment of the cases which were thus affected by the thymol we were able to prevent death, and the immunes finally made an uneventful recovery.

From this work it appears that virulent blood containing sufficient formaldehyde or thymol to inhibit or to destroy organisms such as *Bacillus suipestifer* may be kept in the ice box from one to three weeks at a temperature of 6° C. and then be used for hyperimmunization without serious injury to the immunes, although it must be admitted that there is a certain amount of danger to the immune hog attendant upon the use of blood preserved with thymol.

Tests to determine the potency of serum from immunes hyperimmunized with this preserved virus indicate that such serum will protect pigs weighing less than 100 pounds when given in doses of from 15 to 20 cubic centimeters. As indicated above, the number of experiments in hyperimmunization with virus containing thymol and formaldehyde is not large, and therefore we do not consider that it is absolutely demonstrated that preserved virus can be advantageously used in practice as a substitute for freshly drawn virulent blood. There is, however, every indication that this may be done. The results thus far obtained are certainly sufficient to warrant further work along this line.

IMMUNITY IN OFFSPRING OF IMMUNE SOWS.

Several years ago experiments were undertaken to test the immunity possessed by the offspring of immune sows. These earlier tests were made by exposing the pigs after they were large enough to be weaned, and they were therefore about 2 or 3 months of age when exposed to hog cholera. The earlier tests resulted in showing that in pigs 2 to 3 months old, from immune sows, there was no regular immunity against hog cholera, although in the case of certain litters there appeared to be more than the normal resistance to the disease. In view of the comparatively recent observations of Theobald Smith and of Anderson concerning the immunity possessed by the young of female guinea pigs, which have been actively immunized by the injection of a mixture of diphtheria toxin and antitoxin, it appeared that our earlier tests might have failed to indicate immunity in the offspring, because this passive immunity had possibly been lost during the two or three months of life before exposure to hog cholera. We therefore carried out during the past year tests of immunity in pigs from actively immunized sows, the pigs at the time of the test being from 3 days to 3 weeks of age. It should be noted that Craig (Bulletin 140, Purdue Agricultural Experiment Station, February, 1910) has reported that pigs from two immune sows were apparently resistant to the disease up to the time they were 4 weeks old, but that they later succumbed. Reynolds (American Veterinary Review, vol. 38, November, 1910) has also tested the immunity of pigs from immune sows, and reports that they show a high degree of resistance to hog cholera until they are from 2 to 16 weeks of age.

In these experiments we tested the immunity of pigs 3 days old from 3 immunized sows, from 1 hyperimmunized sow, and from 2 nonimmune sows. We have also tested the immunity in pigs 3 weeks old from 5 immunized sows, making a total of 11 litters tested, 8 from immunized sows, 1 from a hyperimmunized sow, and 2 from nonimmune sows. In testing the immunity of these pigs, all were injected subcutaneously with approximately 0.5 cubic centimeters of disease-producing blood, to which phenol had been added. The virulence of the blood injected was proven in all cases by the injection of nonimmune pigs. The results of these experiments show that not a single pig from an immune or hyperimmune sow died from the injections or showed any ill effects therefrom, whereas all of the inoculated pigs from the two nonimmune sows died of hog cholera as a result of the injection. Furthermore, the mothers of the two nonimmune litters contracted hog cholera from their pigs and both died of the disease. These experiments seem to prove quite definitely that pigs from immune or hyperimmune sows are themselves immune against hog cholera at birth, and that this immunity lasts for at least three weeks. The exact time at which this passive immunity transmitted by the mother becomes reduced to such a point that the hogs are no longer able to resist infection must be determined by future experiments. It likewise remains to be determined whether the injection of virus during the period of passive immunity will result in the production of a permanent active immunity similar to that secured by the simultaneous method of vaccination.

ATTENUATION OF HOG-CHOLERA VIRUS BY HEAT.

A number of years ago, immediately after the discovery that the virus of hog cholera is filterable and exists in the blood of sick hogs, a long series of attempts were made to attenuate the virus by heat and by other agents. None of these experiments resulted satisfactorily, for it was found that the virus did not react uniformly to the attenuating agents. In one case it might be apparently attenuated so as safely to produce an active immunity; in other instances, under precisely the same conditions, the virus would not be attenuated at all and would cause the death of the injected animals; while in still other instances it appeared that the virus was killed by the same process and while not injuring the inoculated animals it at the same time had no effect in conferring an immunity upon them. In the summer of 1911 is was claimed by an investigator that the virus of hog cholera could be satisfactorily attenuated by heating at a temperature of

60° C. for 30 minutes the blood taken from sick pigs. As the attenuation of the hog-cholera virus, if this could be carried out with regularity and with certainty, was a matter of much interest and importance, experiments were carried out to determine the correctness of this work. In these experiments two lots of virus were used. The blood was heated for 30 minutes at 60° C. In one case phenol was added to all of the virus immediately after heating and cooling. In the other lot, half of the heated virus was phenolized, while to the other half no addition whatever was made. The phenol was added in amount sufficient to secure a concentration of one-half to 1 per cent. It does not seem necessary at this time to go into the details of these experiments, but the work may be summarized as follows: Fourteen nonimmune pigs were inoculated with the heated virus. All of these contracted hog cholera from the injection, and 12 died of the disease.

It is our opinion from these experiments and from others previously carried out that the employment of hog-cholera virus supposed to be attenuated by heat is dangerous, because such inoculations may set up disease in localities where it has not previously existed. If, however, the virus has been heated to such an extent that it does not produce disease, it is more than likely it will not give the desired protection from hog cholera.

PRACTICAL WORK IN COMBATING HOG CHOLERA.

During the past year there has been greatly increased interest on the part of officials in the various States and of farmers and stock raisers generally in the work of combating hog cholera through the use of the serum developed by this bureau. At the present time 30 of the States are engaged in distributing serum. In a few States, where the amount of money available is small or where the hog industry is not largely developed, the States have purchased serum of private manufacturers and distributed it to farmers in the State at cost. By purchasing in this way on a large scale the States are able to make the serum available to farmers at a lower price than it could be purchased for in small amounts. The vast majority of the States which are engaged in this work, however, have established laboratories and are manufacturing serum in greater or less amount for distribution to farmers. In some States the serum is supplied free of cost. In others the States charge the cost price of manufacture. There is little uniformity in this practice or in the method of applying the serum. There are States which permit the serum manufactured by them to be applied only by State officials. Others require the employment of a licensed veterinarian, and still others supply to farmers direct upon application. In no State has the work progressed to such a point that a systematic attempt to eradicate the disease has been practicable. As this is without doubt the ultimate object sought by all officials, we may expect that the next few years will see the inauguration of a determined effort to eradicate this disease in at least some of the large hog-raising States.

Precisely accurate statistics regarding the amount of serum which has up to the present time been manufactured and distributed by State authorities have been difficult to obtain. Through a series of inquiries, however, in which the various State authorities have kindly cooperated by furnishing data at their disposal, it appears that considerably more than 1,000,000 doses of hog-cholera serum have been manufactured and applied in all of the various States combined. The results of the practical application of this serum are reported by State officials generally as being very satisfactory. In no case do State authorities report a loss of more than 20 per cent on the average among serum-treated animals, and in most cases the loss is very much less than this. Probably if the serum were applied always by State officials only after careful examination of the herds before treatment, the percentage of loss in exposed herds would not exceed 5 per cent, if indeed it reached this figure.

The various States now have, in the aggregate, a total annual appropriation for the manufacture and application of hog-cholera serum of $100,000. The outlook for the ultimate control and possibly the complete eradication of hog cholera is now brighter than it has been at any time since the disease reached its present state of severity in this country.

FEDERAL CONTROL OF HOG-CHOLERA SERUM.

As the fact that serum from hyperimmunized hogs is a reliable agent for protecting hogs from hog cholera has become known to farmers, there has been a constantly increasing demand for this serum. In fact, this demand has been so great that few if any States have been able to meet it. The result of this has been the organization of a considerable number of privately owned plants for manufacturing this serum. It was not possible during the past fiscal year to test the proprietary serums on the market and to report the results, as authorized by Congress, but work looking to this end is now in progress. Inasmuch as antihog-cholera serum is to be used by State officials for eradicating hog cholera, it appears that the Federal Government, through the Secretary of Agriculture, should be given legal authority to supervise the manufacture of serum prepared in this country for interstate commerce in a manner similar to that already vested in the United States Public Health Service for similar products intended to be used in human medicine. Such regulation could not work to the disadvantage of reputable manufacturers, but rather would be an aid to them in insuring what they desire, namely, an efficacious serum. While not interfering with the business of reputable manufacturers, Federal supervision would tend to eliminate any persons who might attempt to defraud farmers by placing worthless material on the market.

PREPARATION AND DISTRIBUTION OF TUBERCULIN AND MALLEIN.

During the fiscal year 329,771 doses of tuberculin were sent out to State officers to be used in testing cattle for tuberculosis, and 135,699 doses of mallein were likewise furnished for testing horses and mules for glanders.

PROJECTED WORK.

In addition to continuing the routine work, such research work as remains incomplete will be continued. It is contemplated that a considerable amount of time will be spent during the fiscal year 1913 in the study of questions relating to the eradicaton of hog cholera and to the study of changes which take place in meats placed in cold storage. A wide variety of other topics will be taken up, but as these are of minor importance, it does not seem necessary to enumerate them at this time.

THE ZOOLOGICAL DIVISION.

The Zoological Division, under Dr. B. H. Ransom, chief, has continued the investigation of parasitic diseases of animals and the study, collection, and determination of animal parasites.

ROUNDWORMS OF SHEEP.

The investigations relative to stomach worms and other roundworms of sheep have been continued. Important facts concerning these parasites have been determined during the investigations, which have been in progress a number of years. As yet, however, no fully satisfactory methods of dealing with the stomach worm have been discovered.

A new species of roundworm, *Ostertagia bullosa*, has been found in sheep in several of the States in the Rocky Mountain region.

GID IN SHEEP.

No new centers of gid infection have been found during the year. During the year 104 imported sheep dogs, quarantined in accordance with Bureau of Animal Industry Order 176, were examined for tapeworms by means of microscopic examination of the feces. Twenty-seven of these dogs were found to be infected with tapeworms. All of the infested dogs were treated with tæniafuges under the supervision of the Quarantine Division and released after the expulsion of the parasites and after further microscopic examination showed the absence of tapeworm eggs from the feces. As it has been found impossible to distinguish between the gid tapeworm and other tapeworms of the dog on the basis of the eggs found by microscopic examination of the feces, all of the dogs that show tapeworm eggs in the feces resembling the eggs of the gid tapeworm are required to be treated with tæniafuges before they are released.

TAPEWORMS OF SHEEP.

An investigation of an important parasite of western sheep, namely, the fringed tapeworm, *Thysanosoma actinioides*, has been in progress since the spring of the preceding fiscal year. Through the courtesy of a ranch owner near Amo, Colo., the necessary facilities have been provided for a study of the life history of the parasite, and laboratory facilities have been provided through the courtesy of the authorities of Colorado College, Colorado Springs, Colo. The investigation was suspended during the winter, but was resumed in the spring. The first season's work indicated quite clearly that direct infection from sheep to sheep does not occur, but that some intermediate host is necessary. Experiments in the treatment of sheep to free them from the parasite showed that male fern and carbon bisulphid were inefficacious. A third remedy, a proprietary preparation advertised as a sure cure for internal parasites, was tried, but this likewise proved to be inefficacious not only against the fringed tapeworm, but also against other parasites. A report of these treatment experiments is given in Bulletin 155.

CATTLE MANGE.

Under the supervision of Dr. Charles Pearson, of this bureau, an experiment was conducted in northwestern Texas in the treatment of cattle mange with nicotin dip from which the sulphur required under the present regulations governing official dippings was omitted. Twenty-eight cattle showing well-marked cases of mange were selected from a herd of about 800, and these were dipped in nicotin solution without sulphur, the remainder being dipped in the usual nicotin and sulphur dip. The first dipping was done on November 21, and the second dipping on December 4. On inspection, January 5 and February 2, none of the 28 experimental animals showed evidence of the presence of active mange. Finally an inspection of the entire herd, including the 28 that were dipped in the nicotin solution without sulphur, was made on April 24, 141 days after the second dipping, and the herd was found to be free from mange.

The dipping solution from which the sulphur was omitted contained about 0.08 per cent of nicotin. The results of this experiment indicate that nicotin dips without sulphur are efficacious remedies for cattle mange. Further trials of nicotin solution at 0.07 per cent strength are now in progress under the supervision of various inspectors on the field inspection force of the bureau.

INVESTIGATION RELATIVE TO TICK ERADICATION.

Experiments are in progress to determine the length of time after dipping that arsenical dips protect cattle against infestation with ticks. It has been demonstrated that when cattle are dipped repeatedly in arsenical solutions at intervals of two weeks arsenic is stored up in the skin in small quantites. Apparently, however, this has no influence in protecting against tick infestation if a week or more elapses after the last dipping before the cattle are exposed to infestation. On the other hand, it appears that a single dipping is sufficient to protect cattle against infestation during a short period after dipping. Whether this protection lasts only a few hours or one, two, or more days remains to be determined. Further information on this important point will be available when the experiments now under way are finished.

INVESTIGATIONS CONCERNING PARASITIC PROTOZOA.

An investigation of the life history of the Sarcosporidia, concerning which practically nothing is known, has been undertaken and a number of points of importance have already been determined.

Gastrocystis gilruthi, a sarcosporidian parasitic in the wall of the fourth stomach, has been found in sheep in this country.

A number of cases have been observed in western sheep in which *Sarcocystis tenella* formed nodules in the diaphragm and heart which so closely resembled degenerate tapeworm cysts that they are very likely to be mistaken for the latter on casual examination.

PARASITES OF HOGS.

Two species of small nematodes commonly occurring in the stomachs of hogs have been studied, and a bulletin (No. 158) has been prepared concerning them.

A comparison of the common roundworm found in the small intestine of hogs with the similar form occurring in man is being made in order to determine whether they are of the same or of different species.

TRICHINOSIS.

Investigations have been undertaken to determine the amount of cooking necessary to destroy the vitality of trichinæ in pork, as there is more or less uncertainty as to the length of time required to insure the destruction of the vitality of these parasites when exposed to various temperatures.

MEASLES IN CATTLE.

The occurrence of tapeworm cysts in beef (*Cysticercus bovis*, the intermediate stage of the unarmed tapeworm of man, *Tænia saginata*) has become very common. The meat-inspection reports show that nearly 1 per cent of the cattle slaughtered in this country are infested with measles. The heart is most commonly involved, then the muscles of mastication, the diaphragm, and the tongue, in the order given. In cooperation with bureau inspectors at various stations an investigation has been made as to the number and distribution of tapeworm cysts in infested carcasses, upon the basis of which more adequate regulations concerning the inspection of cattle for measles and the disposal of infested carcasses have been formulated to replace those formerly in force.

The causes of the prevalence of measles in cattle and of tapeworms in human beings are the insanitary methods of disposing of human excreta in rural districts and the habit of eating raw or rare beef, which is exceedingly common in this country. The most important prophylactic measure is the proper disposal of human excreta, and by observing simple precautions to prevent soil pollution the farmer and stock raiser will not only protect his cattle from tapeworm cysts and the consumers of beef from tapeworm infestation, but he will also at the same time avoid risk of infection with dangerous diseases, such as typhoid fever and uncinariasis. Every farm should be provided with sanitary outhouses, and defecation in places where there is risk of contaminating directly or indirectly the food or water supply of human beings or live stock should be strictly prohibited.

MEASLES IN SHEEP.

During the year at various stations inspectors of the bureau have found a considerable percentage of sheep originating in certain States in the West infested with tapeworm cysts in the heart and voluntary muscles, and a rather large number of carcasses have been condemned on account of the presence of these parasites in the meat. An investigation now in progress has shown that these cysts are not communicable to man, but that they are the intermediate stage of a tapeworm of the dog. Prophylaxis against this parasite consists in keeping sheep dogs free from tapeworms, which may be accomplished by treating them periodically with a suitable anthelmintic and in destroying the carcasses of dead sheep to prevent their being devoured by dogs.

MEASLES IN REINDEER.

Reports and specimens from the official physician of the Interior Department at Nome, Alaska, have shown that measles are prevalent among the reindeer herds of Alaska, and that commonly the meat of these animals is so heavily infested as to render it unfit for food. The parasite in this case is probably the form known as *Cysticercus tarandi*, which is the intermediate stage of *Tænia krabbei* of the dog. The occurrence of this parasite in Alaska reindeer has already interfered with the sale of reindeer meat in Alaska, and unless measures are taken toward its eradication it is likely that the reindeer industry in that Territory will suffer considerably in the future on account of this parasite.

A PARASITE OF THE HORSE TRANSMITTED BY THE HOUSE FLY.

The interesting fact has been determined that a nematode which occurs in the stomach of the horse, sometimes in enormous numbers, is transmitted by the common house fly, which acts as an intermediate host. This nematode, known as *Habronema muscæ*, produces embryos which pass out of the body of the horse in the feces. The embryos enter fly larvæ, which develop in the feces from eggs deposited by flies, and grow and develop during the growth of the fly larvæ, reaching their final larval development at about the time the full-grown fly emerges from the pupal stage. When an infested fly is swallowed by a horse, the larval nematodes develop to maturity, thus completing the life cycle. A full report of the investigations concerning this parasite has been prepared for publication as bureau Bulletin 163.

INDEX-CATALOGUE OF MEDICAL AND VETERINARY ZOOLOGY.

The preparation and publication of the Index-Catalogue of Medical and Veterinary Zoology, in cooperation with the Division of Zoology, Hygienic Laboratory, United States Public Health Service, have been continued. The subject index of the Cestoda has been completed and is now in press.

MISCELLANEOUS WORK.

The usual amount of correspondence relative to parasites and parasitic diseases has been attended to, numerous specimens sent in by bureau employees and other persons have been identified, and a considerable number of valuable specimens have been added to the helminthological collection of the bureau. An interesting collection of over 200 distinct lots of specimens was obtained in the course of field work done in Colorado during the summer of 1911.

THE EXPERIMENT STATION.

The general character of the work at the bureau's Experiment Station at Bethesda, Md., has been similar during the last fiscal year to that of former years, consisting of independent investigations and investigations in cooperation with other divisions of the bureau with relation to diseases of animals, and the provision of facilities for the other divisions to make investigations of a kind that require farm and field conditions not obtainable within the limits of the city, and the use of large animals which can not well be kept in the city.

INFECTIOUS ABORTION.

Among the independent investigations, if valued by the results obtained, the most important and interesting is that which deals with the bacillus of infectious abortion of cattle.

In the last annual report, and again in a paper written somewhat later, attention was called to a bacillus, slowly and insidiously pathogenic for guinea pigs, found to occur with a fairly highly degree of frequency in cow's milk. The bacillus was defined as a seemingly undescribed organism which probably had escaped detection because of the difficulties associated with its artificial cultivation and the length of time it requires to cause well-marked lesions in experiment animals inoculated with it, and which merited careful study by those who are interested in the widespread movement for the purification and improvement of the commercial milk supply, especially as its presence in milk had been traced directly to the udders of apparently healthy cows. This bacillus, in the course of the year, was definitely proved, both by the experiment station and by the Pathological Division to be the germ of infectious abortion of cattle, which had not previously been demonstrated to occur in milk.

What light this discovery will throw on the subject of infectious abortion generally it is too early to predict. At present it is interesting to note that we have found that cows may continue to expel the abortion bacillus with their milk continuously for several years without giving evidence of their infected condition by aborting or in any other known manner. In this respect apparently healthy cows may present all the phenomena and represent all the dangers of unsuspected carriers and dispensers of disease germs.

The studies we have made on the occurrence of the abortion bacillus in ordinary market milk indicate that infectious abortion is a commoner disease in dairy herds than we formerly believed it to be, that its frequency is increasing, and that vigorous measures should be taken against its further spread.

Whether the abortion bacillus has the power to injure human health remains unknown, although some work with this question in mind has been done at the station. The observation has repeatedly been made that the injection of guinea pigs with cultures of the bacillus mixed with cultures of some other ordinarily harmless bacteria causes pathological conditions that are unlike those caused by the injection of pure cultures alone, and that the difference in the lesions found in the guinea pigs injected respectively with pure and with mixed cultures is in many respects similar to the difference observed in the lesions caused by the injection of pure cultures of the abortion bacillus alone into vigorous, thoroughly healthy guinea pigs and into those that are less vigorous or that have had their vitality reduced through exposure to adverse conditions. For example, pure cultures of the abortion bacillus rarely cause a diseased condition of the joints of the legs when injected into healthy guinea pigs from the station's breeding pens. But when such guinea pigs are injected with cultures of the abortion bacillus mixed with cultures of some other germs, which latter are in themselves innocuous, large swellings in the legs in the region of the joints are very common. Likewise when guinea pigs of reduced or low vigor are injected with pure cultures of the abortion bacillus, the joint disease develops in a large proportion.

From this we may assume that the abortion bacillus, which, if the general literature on the subject can be credited, is capable of causing abortion in widely different species of animals, may be responsible, either by acting as an independent factor or in cooperation or symbiosis with some other bacterium or group of bacteria, for various pathological conditions that have been traced to no definite cause, and that the use of heavily infected milk or infected milk for a long period of time in a raw state may hold out an explanation for some of the conditions, the causes of which remain obscure, that affect artificially nourished human infants.

The subject presented is, to say the least, worthy of careful study, and for the time being we should not fail to recognize that the occurrence of infectious abortion among cattle, and the elimination of the bacillus of infectious abortion with the milk from infected but apparently healthy cows, supplies an argument that can not readily be put aside in favor of the pasteurization, under official supervision, of the entire milk supply.

TUBERCULOSIS.

Several series of investigations relative to tuberculosis have been conducted. Fresh evidence has been obtained to prove that bovo-vaccination, or the injection of living tubercle cultures of an insufficient degree of virulence to cause progressive tuberculosis in cattle, is a practice that should be emphatically condemned as unfit for use in the control and eradication of bovine tuberculosis. Among the bovo-vaccinated animals at the station several became affected with meningeal tuberculosis, and two heifers developed tuberculosis in their virgin udders as a result of the vaccination. The development of tuberculosis lesions in the udders of bovo-vaccinated animals has also been observed elsewhere than at the station. How serious this condition is will be more apparent when we bear in mind that the bacilli injected in the practice of bovo-vaccination are of the human type, which cause only a mild, usually retrogressive, disease in cattle, so that an udder affected with such disease may long retain a normal appearance and yet produce milk saturated with tubercle bacilli of a type which, however mild they may be for cattle, we have no reasons to regard as harmless for human health. In one of our earlier investigations on tuberculosis a cow received an injection through her teat into the udder, without trauma, of a very weakly virulent culture of tubercle bacilli of the human type. As a result the milk of the cow contained tubercle bacilli for a period of six years. She never reacted with tuberculin, and she gave birth to and raised two calves that did not contract tuberculosis, showing that the bacilli in her milk were certainly, through all the six years, mildly virulent germs of the kind originally injected into her udder. The cow illustrates what we may expect to find from time to time in dairy herds that are protected against tuberculosis by bovo-vaccination. It seems that, once the udder of a cow is invaded by tubercle bacilli, no matter how much or how little tuberculous disease develops, her milk thereafter must be regarded as permanently infected.

Studies in the dissemination of tuberculosis through the agency of flies have been made. While we have proved that flies may become contaminated with tubercle bacilli by feeding on the feces of tuberculous cattle and by feeding on other substances that contain tubercle bacilli, it does not seem in the least degree probable that they ever carry the bacilli in sufficient numbers or in a way that actually contributes to the propagation of tuberculosis among cattle or other lower animals or human beings. In this connection we must bear in mind that a few tubercle bacilli may enter the bodies of animals through ordinary channels without causing disease, and that the tubercle bacillus in nature is a strictly parasitic bacterium. Unlike the typhoid-fever germ, it is not capable of multiplying in a saprophytic manner in milk and a variety of other substances; hence, in valuing the significance of the fact that flies may become contaminated with tubercle bacilli, we must bear in mind that the germs we have to deal with on the flies are only the small number that will adhere to their bodies under conditions which are rapidly fatal to pathogenic bacteria, and not such dangerous colonies of germs as is very likely to be the case with typhoid bacilli, when flies contaminated with the latter rub them off to grow and multiply on various articles of human food.

This view of the significance of flies in the dissemination of tubercle bacilli is borne out by the experiments relative to the kind and the intimacy of the exposure required to transmit tuberculosis from diseased to healthy cattle. The work of the station almost justifies a hard and fast conclusion that tuberculous infection can not travel the distance of 10 yards through the air unless it has other aids than air currents and flies. Closer proximity than 10 yards between tuberculous and healthy cattle offers so many opportunities for the transference of infectious material from the former to the latter that flies and air currents need not be drawn upon to supply an explanation for the spread of the disease.

A number of other investigations on tuberculosis have been and still are in progress, one of which is the effect on animal bodies caused by swallowing dead tubercle bacilli in pasteurized milk. It is with some satisfaction that we are able to report that such dead tubercle bacilli seem to be quite harmless, though it also seems that the ingestion of living tubercle bacilli, even when they are not the direct cause of tuberculosis, may reduce the normal resistance of the body against the development of tuberculous processes. More work will be done on this subject.

Some work has been done relative to the different methods in which tuberculin is applied to cattle in its use as a diagnostic agent for tuberculosis and to test the quality of the tuberculin manufactured by different commercial establishments as to its efficiency. The subcutaneous tuberculin test must again be indorsed as the most reliable. The commercial tuberculin tested in the course of the year was found to be satisfactory.

There is great need that active work should be done to discover a simpler reliable method for testing the diagnostic potency of tuberculin than we now have.

The subject of the disinfection of stables that have been occupied by tuberculous cattle has received some attention, and it is hoped from the results already obtained that it will be possible in time to recommend a much simpler, safer, and less expensive process than is now in use.

TEXAS FEVER.

About a year ago information was received that a new, practically specific treatment for Texas fever had been discovered by one of the best recognized authorities on the disease in the country. The treatment consists of the injection of a 1 per cent solution in water of "quinin urea and bimuriate" into the abdominal cavities of animals affected with Texas fever, 1 cubic centimeter of the solution per pound weight of animal.

The treatment was tested on three losts of eight animals each. In each lot four animals were treated and four held as checks or controls. All three tests proved the treatment to be worthless. In the first test quinin urea and bimuriate manufactured in America was used, and in the second and third tests quinin urea and bimuriate manufactured at Brunswick, Germany, as we found by writing to the author of the treatment that he had used the German preparation in his work. In the first test no animals died, but the disease was just as severe and lasted just as long in the treated as in the untreated cattle. In the second test two treated and two untreated animals died, and the remaining four (two treated and two untreated) were equally slow in regaining health. And in the third test three out of four treated and only one out of four untreated cattle died. The surviving treated animal is in no better condition than the three surviving untreated animals.

Post-mortem examination of the treated animals that died proved that the solution of quinin urea and bimuriate had in all cases actually entered the abdominal cavity. This statement is made because the author of the treatment in a letter received from him especially referred to one instance in which the treatment was found to be useless and in which it was afterwards discovered that the solution had been injected into the abdominal wall and not into the abdominal cavity.

Two cattle affected with Texas fever, in addition to the work on treatment above summarized, were given intravenous injections of a solution of quinin urea and bimuriate. This test was made because it provided for a very rapid distribution of the drug throughout the entire body, and because failure to obtain favorable action from the drug when injected subcutaneously or intramuscularly was charged by the author of the intra-abdominal treatment to slowness of absorption. Although the intravenous injected animals remained alive, the course of the disease in their case does not give us reasons for indorsing the treatment they received.

OTHER WORK.

Some work has been and is still in progress relative to breeding hogs immune to hog cholera. The progress made in this work is not encouraging, and does not hold out the promise that we will be able, under the unsatisfactory conditions for work of the kind at the Bethesda station, to establish an immune strain of hogs.

In cooperation with the other divisions of the bureau, and in the line of supplying them with facilities, the following subjects received more or less attention at the station: Tuberculosis, cattle ticks, dipping experiments with cattle, dourine, swamp fever, rabies, blackleg, parasites of sheep, disinfectants dangerous to animals, Malta fever, forage infection and the effect of feeding fungus, Johne's disease, hog cholera, tests of abortion, hemorrhagic septicemia, mange, special tuberculin tests, etc.

The usual quantity of blood, serum, milk, etc., and numerous small animals were supplied for the use of the bureau laboratories.

LOSS OF RENTED LAND.

It is unfortunate that the bureau will lose the use of a tract of land near the station, comprising over 60 acres in area, which has been held under lease for a number of years. This land was recently purchased by a land-improvement corporation to be divided into building lots and tracts. This will reduce the amount of forage that can be raised, and will considerably increase the annual cost for feeding the animals kept at the station. While the 50 acres owned by the United States at Bethesda are amply sufficient for the experimental investigations of the station, it is desirable, for reasons of economy, to have additional land because of the feed that can be raised on it at a much lower price than we are obliged to pay dealers.

REPORT OF THE CHIEF OF THE BUREAU OF PLANT INDUSTRY.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Washington, D. C., September 30, 1912.

Sir: I have the honor to submit herewith a report of the work of the Bureau of Plant Industry for the fiscal year ended June 30, 1912.

Respectfully,

B. T. Galloway,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

GENERAL WORK OF THE YEAR.

The total funds appropriated by Congress for the work of the Bureau of Plant Industry for the fiscal year ended June 30, 1912, were $2,061,686, of which $330,470 was for statutory salaries and $289,670 for the work in connection with the purchase and distribution of seeds, while the remainder, $1,731,216, was apportioned in definite items among the various branches of the bureau conducting scientific or related work. In addition to the foregoing, under the "Miscellaneous" appropriations of the department was an item of $5,000 for investigating the bark disease of the chestnut tree.

The correspondence of the bureau is constantly on the increase, over a million letters, including multigraph letters, having been sent out during the past year in connection with the various activities of the bureau.

The publications, as heretofore, have been handled by Mr. J. E. Rockwell. New bulletins, circulars, etc., to the number of 96, containing 3,360 printed pages, 247 full-page plates, and 589 text figures, were issued during the year. The first editions of these publications aggregate two and a quarter million copies. Eleven papers were contributed to the Yearbook of the Department of Agriculture, and 22 Farmers' Bulletins were prepared and submitted.

In connection with the fiscal operations of the bureau, 7,190 requisitions for supplies were issued, 17,749 accounts were received and audited administratively, 173 requests for contracts and leases were made, 1,519 letters of authorization and amendments thereto were drawn, and about the same number of letters of instruction to field investigators were prepared.

From September 1, 1911, to August 31, 1912, the following changes in the personnel of the bureau were made: Resignations, 299; deaths, 8; dismissals, 1; transfers from the bureau, 11; and furloughs and terminations of appointments, 511; making a total of 830 employees dropped from the rolls during that period. There have been made in the same period 1,318 appointments, increasing the total force of the bureau by 488. On September 1, 1912, the numerical strength of the bureau was 2,270. The total number of employees in the bureau on the same date a year ago was 1,782.

SPECIAL FEATURES.

It may be proper to summarize here some of the special features of the work which has occupied the attention of the bureau since the last report and to outline briefly the chief lines of endeavor proposed to be carried on during the next year.

FARM-MANAGEMENT FIELD STUDIES AND DEMONSTRATIONS.

In the estimates submitted last year there was an item of $50,000 for an extension of the farm-management work, especially throughout the Northern States. This amount was recommended by the Committee on Agriculture of the House and was increased by Congress so as to make a total of $300,000 available for this work during the fiscal year 1913. Although funds were not available until nearly the middle of August, 1912, the organization of the work was rapidly effected, so that it is now under way in 29 States, including all of the Northeastern and Central States and several of the Northwestern and Western States, among them being Washington, Oregon, Wyoming, the Dakotas, Nebraska, and Kansas. The methods of cooperation with agricultural colleges, experiment stations, and other organized agricultural forces within the State are set forth in another part of this report. The work has everywhere been cordially received, and the funds contributed by the States and private forces within the States have equaled those of the department. In nearly all, the field work and demonstrations are conducted on a half-and-half basis, the Government paying half of the expenses and the State, county, or other organization paying the other half. The demands for the work have been so great, and the opportunity for aiding the farmer through it are so numerous, that an estimate of $150,000 increase has been submitted. It is certain that this amount will be readily met by the States where the work is in most demand.

FARMERS' COOPERATIVE DEMONSTRATION WORK.

The Farmers' Cooperative Demonstration Work, inaugurated several years ago for meeting the emergency caused by the boll weevil in the South, has been pushed with unusual vigor during the year just passed. Full details of what has been accomplished in this direction are set forth elsewhere.

During the year, more than 100,000 farmer demonstrators have been actively engaged in this work, approximately 67,000 boys have acted as members of the boys' corn clubs, and about 24,000 girls have served as members of the girls' canning clubs. Owing to the pressing demands for more of this kind of work in the South, an estimate has been submitted for an increase of $75,000. This amount, it is believed, will in part meet the pressing demands which have been made on the department for an extension of this work throughout the Southern States.

ENCOURAGING INVESTIGATIONAL WORK.

While the field of usefulness in connection with the farm-management work and the Farmers' Cooperative Demonstration Work is great, the fact that the future success of agriculture in this country is dependent in large measure on the discovery and application of fundamental principles should be kept in mind. The various laboratories of the bureau engaged in important research need full support. An increase in the funds devoted to several items in this field have been submitted and it is hoped that Congress may approve the same.

Fruit-disease investigations.—The work in connection with fruit-disease investigations has resulted in working out effective methods of controlling fruit diseases which are saving to the farmers of the country tremendous sums of money annually. To enlarge this work and render it more efficient, an increase of $5,000 has been asked for in the estimates.

Cotton and truck-disease investigations.—The demands for investigations of diseases affecting horticultural crops, particularly in trucking regions where wilt and other diseases are doing serious damage, are very pressing, and it is believed that the increase of $8,000 which was included in the estimates is highly important to the best conduct of the work.

Soil bacteriology and plant-nutrition investigations.—During the coming year it is proposed to enlarge some important investigations in connection with soil bacteriology, especially with reference to humus formation and nitrogen production; also to conduct an investigation of the organisms associated with plants growing in acid soils. It has been definitely proved that certain fungous organisms are present and are associated with the best production of such plants. It is proposed to make a careful laboratory study of these organisms with a view to determining their value and usefulness as nitrogen fixers. For this work additional funds are needed, and an increase of $10,000 has been included in the estimates.

Crop-physiology investigations.—It is desired to enlarge the scope of the investigations of dates and figs and work on cotton with the Indians in the Southwest in cooperation with other offices of the bureau. The results of these investigations have been highly satisfactory, and in order to carry on the work effectively more funds will be required.

Crop acclimatization and adaptation investigations.—The development of community work in the growing of cotton is of vital importance to the cotton growers of the South, and steps have been taken toward enlarging this phase of the cotton work, for which an increase of $10,000 has been asked.

Drug and poisonous plant investigations.—One of the most important effects of the work on drugs has been the popularizing of drug-plant production. In several sections new industries have been established, as, for example, the growing of red pepper in South

Carolina. It is estimated that to extend both the demonstrational features of the work and the laboratory investigations an increase of $12,000 will be necessary.

COTTON STANDARDIZATION AND MARKETING INVESTIGATIONS.—During the next fiscal year it is proposed to expend about $25,000 in the important work of cotton marketing, if the increase in the estimates for this work is granted. Millions of dollars are lost annually through improper methods of handling, grading, and marketing cotton. This work has been organized on a definite basis, and communities of farmers are being induced to handle and also to market their cotton cooperatively.

GRAIN STANDARDIZATION.—The time is at hand when it will be possible to establish definite grades for corn, sufficient data having been accumulated as a result of several years' investigation. In the estimates for the coming year an increase of $10,000 has been asked for, in order to establish standards for these grades, which will be on a sound basis and fully applicable to commercial conditions. To bring this about, numerous conferences with representatives of the grain trade will be necessary.

It is also proposed to establish a new grain-standardization laboratory on the Pacific coast. Up to the present time practically no work has been done with grains in the Pacific States. Before standard grades for any of the cereals can be established, a careful study must be made of the methods of handling, storing, transporting, and grading grains in that section. Furthermore, the opening of the Panama Canal will revolutionize the methods now in use, and it is of the utmost importance that the department be in position to render assistance, which can be effectively done through the establishment of a laboratory at one of the important grain centers of this region.

BIOPHYSICAL INVESTIGATIONS.—In the estimates for the next year an increase of $8,000 is recommended, to be used for important work in the West in connection with the malnutrition work, the object of which is to determine the cause of the malnutrition of citrus and other orchard trees in irrigated districts. Urgent appeals have been received for an investigation of this subject in California, and work of a preliminary character has been started.

SEED-TESTING LABORATORIES.—In connection with the act passed August 24, 1912, to prohibit the importation into the United States of seeds adulterated and otherwise unfit for seed purposes, which takes effect on February 24, 1913, and for the enforcement of which regulations are now in process of preparation, a great deal of additional work will be thrown upon the Seed Laboratory. To care for this work, and in order to establish another field seed-testing laboratory, an increase of $5,000 has been submitted in the estimates.

CEREAL INVESTIGATIONS.—The demand for definite scientific investigations of cereals in the South is very strong, and during the coming year it is proposed to materially enlarge this work, which includes the breeding and selection of varieties better adapted to southern conditions. Requests for work of this character have been received from many sections of the South. To properly carry on this important work will require a material increase in the cereal funds, and the estimate contemplates $20,000 additional.

Tobacco investigations.—In connection with the tobacco work which is being carried on in all important tobacco-growing sections, insistent demands for enlarging the work are being received from several sections, including the Carolinas, as well as Kentucky and Tennessee. In order to partly comply with these demands during the coming year an increase of at least $5,000 will be required.

Forage-crop investigations.—Growing out of the regular seed-distribution work and now equal in importance to many of the other lines of scientific research are the forage-crop investigations. The present appropriation is entirely inadequate to effectively carry on any organized field work, and for this reason an increase of $15,000 has been estimated for. The question of suitable forage crops for various sections of the country, especially in the South and in the drier sections of the Northwest, is an important one.

Investigations in economic and systematic botany.—In the estimates submitted for the coming year an entire change in the phraseology of this item has been recommended, as well as an increase of $5,000 to enable the office to undertake important cooperative work in connection with the identification and utilization of plants on the forest reserves.

Alkali and drought resistant plant breeding.—The breeding of crops for the dry sections of the West has become an important factor in connection with the investigations which are under way in the Great Plains area, and some very promising results are being secured. Studies are also being made of the relation of alkali and drought to the malnutrition of irrigated orchards, which are being carried on in cooperation with other offices of the bureau. A small increase has been recommended for this work.

Sugar-plant investigations.—Investigations of the diseases affecting the sugar beet, as well as the securing of higher yielding strains of sugar beets, are proving successful. During the coming year it is desired to extend this work to new sections. The work with sugar cane in the South is also being pushed.

Western irrigation agriculture.—The demands for help from the settlers on the new irrigation projects are very pressing, and numerous problems have arisen which will require extensive study. In order to be in position to furnish the advice and assistance which is needed, additional funds will be required. One important feature of the work has been the development of the growing of Egyptian cotton in the Southwest, and during the coming year it is proposed to establish the industry upon a sound commercial basis if possible.

Pomological investigations.—Little attention has heretofore been given to a study of the factors affecting the shipment of fruit abroad, our attention having been largely confined to a study of the domestic marketing, transportation, and storage of fruit, the demand for definite scientific information along these lines being very great. During the coming year it is proposed to devote particular attention to the problems affecting the exportation of fruit. With the increasing production of apples and other fruits in this country, the value of such investigations will be apparent. To carry on this work a substantial increase will be necessary.

Horticultural investigations.—The past year or two has emphasized the necessity of developing varieties of potatoes of better quality and higher yielding than those now grown in the United States. With this purpose in view, extensive experiments have been inaugurated in various parts of the country for the breeding and selection of better types. The funds available for the work, however, are entirely inadequate to secure the best results. In view of the great importance of the crop, an increase of $10,000 has been estimated for. There is also great need for work in the matter of the better culture, handling, and marketing of the various truck crops grown along the South Atlantic coast and elsewhere. A change in the wording of the clause giving authority for this work, as well as a material increase in the funds, has been recommended in the estimates.

Foreign seed and plant introduction.—The importance of the work of introducing and propagating seeds and plants from foreign countries can scarcely be realized. Many of the most important crops now grown and many of the best varieties have been introduced from abroad, durum wheat being perhaps the most striking example of recent years. Thousands of new things are now growing at the various plant-introduction gardens, many of which will become of economic importance to the agriculture of the country within the next few years. This work has been greatly hindered because of the inability to keep a sufficient number of explorers abroad in regions which are known to possess plants of value and because of the impossibility of securing large quantities of what are believed to be particularly valuable species. In the estimates for next year an increase of $25,000 in the funds available for the work has been recommended.

Congressional seed distribution.—Notwithstanding the largely increased cost of vegetable and flower seed, we have been able to maintain the quotas of vegetable, flower, and other seeds allotted to Members of Congress at the same level, viz, 20,000 packages of vegetable seed, 2,000 packages of flower seed, etc. With the 42 new Members which will be in the next Congress, however, it will be necessary to materially reduce the quotas unless additional money is appropriated. It is estimated that with the present funds a decrease of about 15 per cent in the total number of packages allotted will be necessary, but if the allotments are to be maintained as at present an additional $30,000 will be needed. The same is true regarding the distribution of drought-resistant field seeds, provision for which was contained in the appropriation for the present year for the first time. No estimate for an increase of funds to take care of this item has been submitted.

NEW FIELD STATIONS.

Northern Great Plains field station.—A new station has been established at Mandan, N. Dak., under the authority given by Congress at the last session to establish an experiment farm in the northern section of the Great Plains area. A half section of land has been selected and steps have been taken to secure title. Additional land, amounting to half a section, is to be purchased by the citizens of Mandan, deeded to the board of trustees of the State Agricultural College of North Dakota, and a lease is to be executed by them to the

Department of Agriculture. The station will be equipped with suitable buildings for carrying on general experimental work, including the testing and propagation of trees, shrubs, fruits, and vegetables for the Great Plains area.

Potato and sugar beet station.—Among the miscellaneous appropriations for the department for the fiscal year 1913 was a paragraph appropriating $10,000 for the investigation of the cultivation, acclimating, and development of improved types of potatoes and sugar beets. Under the authority contained in this section, a potato and sugar beet station has been started just outside of the city of Jerome, Idaho, where experiments with potatoes and sugar beets have been commenced and will be actively pushed with the opening of the next growing season. The main object of the work is to develop types particularly adapted for culture under irrigation.

PLANT-QUARANTINE ACT.

Under the plant-quarantine act approved August 20, 1912, what is known as the Federal Horticultural Board has been organized, with two representatives of the bureau thereon. The necessary regulations for the enforcement of the act have been promulgated, and under them the importation of potatoes from countries infected with the potato wart has been prohibited; also the importation of four species of pine, in order to protect the pine forests of this country against the white-pine blister rust.

SUMMARY OF PROGRESS.

Brief summaries of the progress of the work in the various branches of the bureau are set forth in the accompanying pages.

LABORATORY OF PLANT PATHOLOGY.

The work of the Laboratory of Plant Pathology has continued under the charge of Dr. Erwin F. Smith, assisted by Dr. R. E. B. McKenney, Miss Nellie A. Brown, Miss Florence Hedges, and others.

Knot of citrus trees.—A bulletin on the knot of citrus trees caused by *Sphaeropsis tumefaciens* has been completed and published. The investigations reported therein cover a period of six years, during which time the cause of the disease has been established beyond doubt by means of numerous inoculations, reisolations of the fungus from the knots thus artifically produced, and reinoculations with the fungus thus obtained. This disease has proved destructive in Jamaica, and recently the same or a very similar malady has been discovered in Florida. It occurs also on oranges in Cuba. The disease is characterized by the formation of abnormal growths which cause the branch or stem beyond them to become stunted and finally die. Under favorable conditions witches'-brooms and many secondary knots are formed. Experiments have shown that the disease can be controlled by cutting and burning the diseased parts. In pruning, the fact must be borne in mind that the fungus may extend far beyond any external sign of infection.

Crown gall.—The study of the crown-gall of orchard trees, small fruits, and other plants has been continued, because of its economic importance to orchardists, farmers, and nurserymen.

The conclusions reached have been published in a bulletin recently issued, the illustrations of which show graphically the advance which has been made. The bacterial organism producing the disease, which had been isolated repeatedly but never found microscopically in the plant cells before, has now been demonstrated successfully. The infectious nature of the organism isolated has been proved by hundreds of inoculations, and many cross inoculations show its ability to produce galls on other plants than the one from which it was isolated. As the bacterium is a soil organism which gets into the plants through wounds due to careless grafting, borers, nematodes, etc., planters should aim to keep their land free from it by refusing to plant infected stock. Nurserymen should plant on uninfected land and carefully avoid heeling good stock into soil which previously received infected plants.

PATHOLOGICAL COLLECTIONS AND INSPECTION WORK.

The work of the past year has continued under the supervision of Mrs. Flora W. Patterson.

Extent of the collections.—An inventory has been made showing more than 60,000 specimens. The acquisitions include two rare and valuable old sets of exsiccatæ. About 300 permanent mounts have been made from pure cultures and other interesting subjects.

Many identifications have been made for the Office of Grain Standardization and the Bureau of Entomology, with a view to the economic application of such information, and the work on soil fungi or species possessing cellulose-destroying properties has received attention.

The constant demand for a semipopular bulletin for the identification of common poisonous and edible mushrooms has been recognized, and the preparation of such a publication is near completion.

Inspection work.—The work of inspecting all suspected plants which are introduced by the bureau is performed for the Offices of Foreign Seed and Plant Introduction and of Crop Physiology and is rendered more effectual by the extensive indexing of foreign and domestic pathological and mycological literature, which provides up-to-date information concerning diseases indigenous to localities of prospective importations.

FRUIT-DISEASE INVESTIGATIONS.

The fruit-disease work of the bureau has continued in charge of Mr. M. B. Waite.

Work in California.—Work at Watsonville and other points in California on the powdery mildew of the apple has made satisfactory progress. The difficulty of preventing this disease by spraying has led to important advances in the discovery and use of new fungicides. Various diseases of the apricot, cherry, peach, and plum have also been studied.

SPRAYING DEMONSTRATIONS.—Successful work in spraying has been continued by Prof. Charles Brooks, who was appointed to fill the vacancy caused by the resignation of Mr. W. M. Scott. This work is along essentially the same lines and will be extended.

FUNGICIDES.—The lime-sulphur solution has proved to be wonderfully successful as an apple spray for the earlier treatments, but not satisfactory for certain diseases, like bitter-rot and blotch of the apple and black-rot of the grape. Rapid progress has been made in determining the limitations of the lime-sulphur solution and the special advantages of using it and Bordeaux mixture for certain diseases.

PHYSIOLOGICAL DISEASES.—The attacks of physiological diseases that began in the spring of 1911 continued to be severe throughout the season. They seriously affected the crop of apples and resulted in loss of many trees in the Western States. Investigation of the pathological phases of these problems has been taken up, and Mr. W. S. Ballard has devoted a large proportion of his time to it. Rosette, chlorosis, and related diseases have continued to be severe on the apple, peach, apricot, and grape in large sections of the arid and semiarid parts of the United States.

PEAR-BLIGHT ERADICATION.—The work of eradicating pear-blight in the Western States has been continued. A form known as collar-blight on the apple has been given particular attention in Virginia, West Virginia, Maryland, and Pennsylvania, where it is very severe on the Grimes Golden. Eradication experiments and demonstrations are being carried on to combat this disease.

CEDAR RUST.—The fungus causing cedar rust or orange rust of the apple, being greatly influenced by climatic conditions, again became a serious pest in 1912. The disease was reduced but not entirely prevented by the destruction of cedar trees. Demonstrations have shown that three applications of lime-sulphur solution at the proper time will control the disease.

NUT DISEASES.—The entire time of one assistant, Mr. F. V. Rand, is now devoted to the study of nut diseases. The fungus causing pecan rust has been described and named and successful treatment demonstrated. Other diseases of the pecan are also under investigation, including the physiological disease known as pecan rosette, in Florida, Georgia, and other Southeastern States. Studies of other nut diseases, such as those of the native black walnut, are in progress.

PEACH BROWN-ROT AND SCAB.—Experiments were continued in Delaware, Michigan, and West Virginia demonstrating the efficacy of self-boiled lime-sulphur solution in the control of the brown-rot and scab of the peach. The mycological investigation of brown-rot and studies of the scab fungus and other peach and apple diseases are in progress at the new field station at Cornelia, Ga. Spraying experiments and demonstrations are being carried on in Delaware, Georgia, Michigan, Kansas, and Arkansas.

BITTER-ROT AND OTHER DISEASES OF THE APPLE.—Spraying demonstrations conducted in 1911 for bitter-rot in Arkansas and for scab in Delaware, Kansas, and Michigan are being continued in the same States in 1912. Work in Kansas caused a revision of the schedule of application for blotch; Bordeaux mixture controlled the disease, while lime-sulphur solution was efficacious only in mild cases. Sphaeropsis spots were prevented by lime-sulphur solution in all demonstrations and experimental orchards. The spot on the Jonathan and the Spitzenberg has been shown to be due neither to injury by arsenate of lead nor to a fungous parasite. Early picking and prompt cold storage has been found efficacious. The New Hampshire fruit-spot was easily controlled in Delaware by spraying. A fruit-spot on the Grimes Golden in storage has been shown to be due to a fungus. The physiological disease known as bitter-pit, which has heretofore baffled all attempts at treatment, is being especially investigated.

Deciduous-fruit rots.—It is proposed to push investigations already started and to make a thorough pathological study of the factors concerned in the decay of apples, pears, peaches, and grapes, particularly of the fungous decays and the conditions controlling them, to the end that the enormous losses to fruit in storage and in transportation may be at least partially prevented.

Citrus diseases.—The investigation of diseases of citrus fruits heretofore studied incidentally is now to be pushed vigorously. Mr. J. G. Grossenbacher, formerly of the Geneva experiment station, has been employed to take up this branch of the work, which will include the study of the diseases of subtropical fruits, especially in Florida and California.

Diseases of the cranberry and other small fruits.—Spraying experiments and demonstrations with grape, cranberry, and gooseberry diseases have been carried on with success in several localities. A study of the rots of cranberries in storage and transit has been undertaken. The results of work on anthracnose, bitter-rot, and ripe-rot of fruits indicate that these diseases are due to the same organism, a fact of much importance in connection with their control.

A comparative study of the behavior of fruit parasites, in Europe and America, has revealed many interesting facts bearing upon the distribution, identity, and probable danger from the introduction of foreign diseases. Further progress has also been made in the study and control of diseases of strawberries, blackberries, gooseberries, and currants.

Plans for future work.—It is proposed to continue investigations, along essentially the lines already mentioned, during the present fiscal year; also to establish in the Middle West a field station similar to that at Cornelia, Ga., particularly for the investigation of apple diseases. During the fiscal year 1914 it is expected that still further attention will be devoted to research work, particularly to the difficult physiological problems, to the cause and methods of control of the fruit decays, and especially to strengthen the work on citrus diseases. The work on deciduous fruit spots is to be continued along lines which have been so successful in the past.

INVESTIGATIONS IN FOREST PATHOLOGY.

The investigations of the diseases of forest and ornamental trees have contiued under the direction of Dr. Haven Metcalf on about the same lines as in previous years.

Chestnut bark disease.—Investigations in immediate charge of Prof. J. F. Collins indicate that the chestnut bark disease has continued to spread, and can now probably be found over the entire range of the chestnut. Many new facts regarding the disease have been brought to light. The public demand for information and advice has been unprecedented, and to supply it has consumed a large share of the energies of the office. Much time has been given to advising private owners in districts already infected in relation to the destruction or care of the diseased trees in order to delay the spread of the disease. Some investigators entertain the hope that the disease may become inactive after a few years. If this hope should be realized, it is all important that its progress be delayed in the meanwhile as much as possible.

The emergency appropriation for work on the chestnut bark disease necessitated a great increase in activity along this line during the present year. All work will be organized in close cooperation with the States concerned, particularly Pennsylvania and Virginia, which already have appropriations for this work. Many of the most fundamental facts regarding the disease are still to be determined, so considerable energy must be put into pure investigation as well as into direct efforts to suppress the disease. It is planned to give considerable attention to conditions in those States where infection is apparently slight, such as North Carolina, Tennessee, Kentucky, Virginia, West Virginia, and Ohio.

White-pine blister rust.—Continued work against the blister rust of the white pine, under the immediate charge of Dr. Perley Spaulding, has disclosed the presence of the disease in many plantations of imported trees hitherto regarded only as suspicious. In one case trees in which the disease had apparently remained dormant for five years exhibited this season the most severe attack of the disease yet seen in America. It is obvious that no inspection of these trees at the time of their importation could have shown their real condition. A bulletin on the present status of this disease in America is ready for press.

The passage of the plant-quarantine bill makes it probable that white pines will not longer be imported from Europe. The plantations of imported pines already here, however, will have to be closely watched for an indefinite period. Extensive investigations are contemplated of the actual status and danger from other imported diseases, at present inconspicuous, particularly on ornamental tree stock.

Forest hygiene.—Work bearing on forest hygiene under the immediate charge of Dr. George G. Hedgcock has continued on the same lines as heretofore, in close cooperation with the Forest Service. The work has been extended so that there are now coöperating pathologists in four of the six national forest districts. In view of the policy of the Forest Service to include snags and dangerously diseased trees in the contracts for cutting when timber sales are made, this work will necessarily be continued and extended. A bulletin by Dr. E. P. Meinecke, bearing particularly on conditions in California and Nevada, has been issued.

Correspondence relating to the control of diseases of ornamental trees and shrubs is at present so heavy as to take about one person's time through the entire year, and from May to October the time of two persons. The issue of bulletins to partly meet this ever-increasing demand is contemplated.

PLANS FOR FUTURE WORK.—It is planned to continue work along the present lines during the next fiscal year without change of appropriation, policy, or personnel.

COTTON AND TRUCK DISEASE AND SUGAR-PLANT INVESTIGATIONS.

The investigations of cotton and truck-crop diseases and of sugar plants have been continued during the year in charge of Mr. W. A. Orton.

COTTON DISEASES.—The work relating to cotton has been centered on the control of cotton wilt and root-knot. The problems are (1) to bring into general use the resistant strains already developed in a way that will insure their perpetuation, (2) to demonstrate the best methods for the control of root-knot through rotations with immune crops, and (3) to develop new wilt-resistant varieties suitable for boll-weevil conditions. The first two objects have been successfully attained by cooperation with the Office of Farmers' Cooperative Demonstration Work in South Carolina by the help of the State experiment station, and in Georgia by the help of the State board of entomology. This work will be continued during the present year with a view to its extension to other States. Wilt-resistant strains for boll-wevil conditions are being bred at Florence, S. C., and Headlands, Ala. The promising strains developed ought to be widely tested.

TRUCK-CROP DISEASES.—Potato diseases have been given major attention. These problems were studied in Germany, and a specialist has undertaken a fundamental study of the fungous genus Fusarium, to which wilt and leaf-curl are generally attributed. The critical points of relationship involved are to be cleared up, so that the work can be taken into the field and extensive experiments made with control measures. Such work in the West is being arranged for this season under a new special appropriation. The scope of this work should be extended. Facilities now lacking for the handling of its problems in a way that will bring the promptest relief to the industry should be supplied in California and in the central and eastern States.

SPRAYING DEMONSTRATIONS.—The perfecting of field methods for the control of truck-crop diseases, and the demonstration of these methods in communities where the culture of some crops is rendered unprofitable by outbreaks of disease, has been shown by experience to be one of the greatest aids the department can render the truck growers. The leaf-blight of cucumbers and cantaloupes was successfully controlled in Florida. The same work is being repeated in New Jersey. The spraying of celery has been begun in New York in connection with studies of the problem of keeping the crop in winter storage. Celery spraying in southern Florida, potato spraying in northern Florida, and the repetition of the cantaloupe demonstration are planned. This work is to be extended to other communities and crops as rapidly as men can be trained.

SWEET-POTATO DISEASES.—During the past year investigations of dry-rot and of stem-rot of the sweet potato were materially advanced. To complete the studies of these and other important maladies of this crop will yet require much attention.

RUST-RESISTANT ASPARAGUS.—Positive successful results in breeding asparagus for rust resistance are in sight. Several thousand pedigreed seedlings of great rust-resistant quality are being grown at Concord, Mass. Small lots will be distributed for trial, and a seed-growing field established where cross-pollination with nonresistant asparagus can be avoided.

GINSENG DISEASES.—The cooperative work with the Cornell Agricultural Experiment Station, begun last year, has been continued. The field work covers the principal ginseng-growing States.

FORAGE-CROP DISEASES.—Cowpea disease work, having primary reference to the production of varieties resistant to wilt and root-knot, has been continued. Diseases of alfalfa, clover, and soy beans invite study, but only incidental attention can be given them, because of the necessity of using the funds for other work.

SUGAR-BEET INVESTIGATIONS.—The sugar-beet leaf-spot work at Rocky Ford, Colo., is to be continued for two years more. A thorough study of root-rot and damping-off is under way at Madison, Wis. A study of the failure of beets to produce seed is being made. Tests of cultural methods for sugar beets at Garden City, Kans., at Ogden, Utah, and at three other stations is to be extended to other districts.

The improvement of sugar beets and the production of American seed is being given increased attention. Laboratory facilities for about 60,000 analyses have been provided through the cooperation of companies interested. Cooperating firms propose to engage in the production of seed, and the outbreak indicates that one or more of the great European breeders will soon establish American branches.

OTHER SUGAR PLANTS.—Experiments in the culture and diseases of sugar cane are being inaugurated in Texas. It is necessary to build up a staff of specialists and establish field stations for this work.

The laboratory work on the maple-sap problem has been completed, and the results prepared for publication by the Vermont Agricultural Experiment Station. Preliminary tests already made indicate that it will be possible to so improve the sugar content and purity of sorghum by modern plant-breeding methods as to greatly promote sirup production.

CROP PHYSIOLOGY AND BREEDING INVESTIGATIONS.

The investigations in crop physiology and breeding have been continued under the direction of Mr. Walter T. Swingle.

COOPERATIVE WORK ON INDIAN RESERVATIONS.—The cooperative work on the Indian reservations of the Southwest has developed in a highly satisfactory manner during the past year. Experiments in growing Egyptian cotton have proved that a very superior cotton can be profitably grown by the Indians and the white settlers in the irrigated valleys of southern Arizona.

A matter of much importance is the fact that Indian labor can be trained to pick the cotton in a satisfactory manner, so that while the women and children pick the cotton on the home plantations the men and boys make efficient helpers for the white settlers in the Salt River Valley, where approximately 1,000 acres of cotton were this year grown. A considerable portion of the time of the foreman of the Sacaton station has been devoted to the supervision of these plantings under the general direction of the committee on Egyptian cotton culture composed of those officers in the bureau whose work relates to this subject.

An important development of the work on the Gila River Indian Reservation has been the satisfactory results of the experiments in controlling alkali. The application of proper cultural methods has demonstrated that pumped water, heretofore considered unsatisfactory and believed to cause rapid and certain deterioration of the land, is perfectly suitable for ordinary fruit and field crops.

Experiments have been continued in the growing and testing of other crops likely to prove of value. An important new industry has been created in the growing of disease-free Bermuda onions, while experimental plantings of the date palm, fig, pistache, and pecan have attracted the attention of the settlers.

Date culture.—The introduction of date culture on a commercial scale in the United States is now practically an assured fact. Somewhere between $50,000 and $100,000 have been invested in the industry by private parties during the past year, and at least three private expeditions have been sent abroad for offshoots of known varieties.

The department has cooperative date gardens in Texas, Arizona, and California—six in all—where the best varieties of the Old World are being tested. Private growers are being encouraged to engage in date culture and are assisted in every possible way in the management of this unfamiliar enterprise, which shows promise of being profitable in the Southwest.

The success of date culture in this country will be due largely to the discovery of a special method for the artificial ripening of the fruit, whereby the choicest varieties of late dates, such as the famous Deglet Noor, may be ripened, even in unfavorable seasons, wherever the dates grow to maturity on the trees. Under this method, dates equal to the best imported from northern Africa are now produced.

Some half-million date seeds have been planted in the Southwestern States during the past few years, most of them through a cooperative arrangement with the department. Many promising new varieties thus originated require the development of methods for their rapid propagation. These methods may also be applied to rare and valuable varieties from the Old World. Experiments to this end are now under way at Indio, Cal.

Smyrna fig culture.—The culture of the best sorts of Smyrna figs has been brought to a very satisfactory state. A seedling fig orchard has been leased at Loomis, Cal., and choice varieties of caprifigs (necessary for making the fruit set) have been distributed free to growers under condition that they test a designated number of seedling figs for each caprifig received.

Because of the encouragement thus given, some 12,000 acres have been planted to Smyrna figs in California during the past year, and the industry can now be said to be on a permanent basis. Plans are being formulated for the extension of the cooperative distribution of seedlings and cuttings, and it is proposed to establish caprifig orchards in several locations, so that the trees may be grown under diverse climatic conditions, rendering it possible to supply caprifigs at all seasons as needed.

The importance of the work of originating new and valuable varieties especially suited to American conditions has been strikingly demonstrated at Loomis, Cal., where seedling figs of the best quality have been developed. One of the new varieties, the Rixford, is of especial promise because of its remarkable adaptability for transportation in cold storage in fresh condition and because of its ability to withstand rain at the ripening season without fermenting. The fig-breeding work has been considerably modified by the discovery of an Abyssinian fig that carries pollen in the winter generation, which permits early figs (the Berbas) to be caprified, thereby improving their shipping and eating qualities.

Citrus-breeding work.—The new citrus fruit, the citrange, has been widely distributed throughout other regions just outside the limits of ordinary citrus culture. Reports from cooperators comment on the decided value of these new fruits as a substitute for the lemon. Most of the trees are also handsome ornamentals.

Breeding experiments have been continued on a large scale, and several thousand new citrus hybrids have been distributed for cooperative testing by private growers. Experiments are being made to discover methods to force the rapid fruiting of new hybrids, so that their value may be determined in the least possible time.

This citrus breeding work has emphasized the desirability of a detailed botanical study of the wild relatives of our principal crop plants. These wild relatives of our common citrus fruits are being now imported as rapidly as possible for testing in connection with citrus work.

Another new type of citrus fruit, the tangelo, obtained by crossing the grapefruit and the tangerine orange, has recently attracted much attention. Commercial plantings are being made in Florida of the Sampson tangelo, which is like a new and very high-flavored type of orange, showing little of the grapefruit or tangerine in its qualities.

SOIL-BACTERIOLOGY AND WATER-PURIFICATION INVESTIGATIONS.

The investigations in soil bacteriology have continued under the direction of Dr. K. F. Kellerman, assisted by Mrs. Ira G. McBeth and others.

Pure cultures of nodule-forming bacteria for inoculating approximately 30,000 acres of leguminous crops were distributed during the fiscal year 1912. The use of pure cultures is advocated, because of their convenience in handling and in order to avoid the dissemination of crown-gall by the shipment of soil from old fields. Carefully supervised field experiments have been undertaken in Pennsylvania and Ohio, and it is planned to continue both the field work and laboratory studies of the physiology and life history of strains of *Bacillus radicicola* in the hope of devising improved methods for the propagation and distribution of pure cultures.

Advisory correspondence regarding the improvement of farm water supplies, ice ponds, and reservoirs, heretofore carried on, has been discontinued.

Investigations of the bacterial flora at Fallon, Nev., Logan, Utah, and Riverside, Cal., as well as in the vicinity of Washington, D. C., have been continued. Especial emphasis has been given to the decomposition of cellulose, the fixation of atmospheric nitrogen, and the nitrification of organic matter. Many new types of cellulose ferments have been discovered. It is planned to continue the study of the organisms causing the decomposition of organic material in the soil and their nitrifying and nitrogen-fixing properties.

ACCLIMATIZATION AND ADAPTATION OF COTTON, CORN, AND OTHER CROPS.

The investigations directed toward the acclimatization and adaptation of varieties of cotton, corn, and other crop plants that have originated in tropical countries have been continued under the general supervision of Mr. O. F. Cook, assisted by Mr. G. N. Collins. Different branches of the field investigations are conducted by Messrs. J. H. Kinsler, H. Pittier, and D. A. Saunders. Particular attention is given to the adaptive characters, environmental reactions, methods of breeding, and local adjustment of varieties of cultivated plants, in order to determine the best methods of improving the crops, to develop increased resistance to unfavorable conditions, diseases, and insect enemies, and to extend the range of cultivation in the United States.

Change of policy in cotton-breeding work.—The general policy of the cotton-breeding work has been modified gradually in the direction of giving more attention to the preservation and utilization of superior varieties, instead of to the development and distribution of new sorts. With several varieties planted in the same neighborhood a process of mongrelizing is continually going on through crossing in the fields and the mixture of seed at gins. The new plan is to encourage the exclusive planting of superior varieties, each in the region where it is best adapted.

Organization of cotton growing on a community basis.—Study of the problem of utilization of superior varieties of cotton has led to a recognition of the fact that such varieties are of the most value in well-organized communities wherein a single type is grown. Such conditions afford the best prospects of avoiding mixture of seed at gins or crossing in the field, of applying improved methods of culture and selection, and of producing a commercial quantity of high-grade fiber. As a means of encouraging such organizations of cotton-growing communities a new project for the cooperative growing and marketing of cotton has been inaugurated.

Simultaneous planting to avoid weevil injury.—Further study of the factors of weevil resistance has led to a recognition of simultaneous planting as an effective method of avoiding injury. It is possible in this way to avoid the dangers of exposure to cold weather through planting too early and of having late plantings destroyed by weevils bred in early fields in the same neighborhood.

COTTON IMPROVEMENT UNDER WEEVIL CONDITIONS.—The results of a study of weevil conditions have been published in a Farmers' Bulletin, showing that the presence of the boll weevil does not prevent the improvement of the cotton crop through the use of better varieties and the production of better fiber. In the early days of the boll-weevil invasion it was believed that all but the extra-early and rather inferior short-staple varieties would be excluded, but this danger has now been avoided. The old late-maturing varieties of upland long-staple cotton are likely to go out of use, to be replaced by newly developed, early-maturing, long-staple varieties.

ACCLIMATIZATION OF THE DURANGO COTTON.—A new Upland long-staple cotton, the Durango variety, has been derived from Mexican stock by acclimatization and breeding for several years in Texas. It is much earlier than the old late-maturing long-staple varieties, less susceptible to weevil injury, and more resistant to drought, so that it can be grown in many regions to which the former long-staple varieties were not adapted. The Durango cotton has thus far shown itself distinctly superior to any other variety of Upland long-staple cotton for irrigated conditions in Texas and other Southwestern States. Select stocks of seed are being increased as rapidly as possible, more than 200 acres being grown in different communities in the season of 1912.

DISTRIBUTION OF IMPROVED VARIETIES.—Continued distributions are being made of superior varieties of American Upland cotton bred by this department. The culture of the Columbia long-staple cotton is being extended rapidly in South Carolina and adjacent States, the Lone Star variety in Texas, and the Trice variety in Tennessee, Arkansas, and Mississippi, in regions recently invaded by the boll weevil. The Lone Star cotton belongs to the same Texas big-boll series as the well-known Triumph variety, but its habit of growth is somewhat more upright, and it has larger bolls and longer lint. The Trice cotton is a very early and prolific variety, with larger bolls, better lint, and more uniform than the King.

THE NEED OF EDUCATION IN COTTON BREEDING.—After a superior variety has been bred, distributed, and established in cultivation the problem of maintaining its uniformity by continued selection still remains. It is essential to the success of the plan of community organization that farmers learn how to select and rogue their fields, at least those that are to produce seed for planting. The work is not difficult when once understood, but it has to be learned by actual practice in the field in order to develop the necessary skill. One of the most important steps that can now be taken in the improvement of the cotton industry is to provide field training for men who can serve as guides and instructors of local communities.

HEREDITY AND COTTON BREEDING.—A general bulletin has been published showing on the one hand the application of heredity to the breeding of cotton, and on the other hand the bearing of facts learned in the acclimatization and breeding of cotton upon some of the fundamental problems of heredity. Recognition of the general fact that heredity involves two distinct processes, transmission and expression, makes it possible to secure a better understanding of many matters of agricultural importance, such as the diversity and instability of expression that are induced in a select stock by crossing with other varieties or with degenerate mutations. Another result of these investigations of general problems has been to develop more simple and effective methods of breeding and selection.

Extension of cotton culture.—One of the inevitable results of the boll-weevil invasion is the extension of cotton culture into the drier regions of Texas and other Southwestern States where the climatic conditions afford protection against the weevils and other adverse conditions encountered in the more humid Eastern States. The fact that cotton is a dry-land crop that can be brought to maturity with a very small amount of water is only beginning to be appreciated and is likely to lead eventually to a complete change in the agricultural prospects of much of the southwestern country. In districts where water for irrigation purposes becomes available, long-staple cotton is likely to become the principal crop, for, with a properly controlled supply of water, fiber of good quality can be produced if the soil conditions are at all favorable; but special methods of culture, thinning, roguing, and picking have to be used in the production of superior fiber, and these methods require the establishment of communities of intelligent and efficient farmers.

The extension of cotton culture into the Southwest is responsible for the settlement of a new farming population under conditions quite different from those of other agricultural regions of the United States. The production of the cotton crop in particular calls for farming activity during the summer months when human endurance is often carried to its extreme limits. The lack of any adequate protection from the midday heat, such as the inhabitants of other arid countries have learned to provide by thick-walled adobe or stone houses, which make it possible to rest in the middle of the day, is a cause of much unnecessary suffering and loss of agricultural efficiency. It is proposed to consider the human factors as well as the plant adaptations in future studies.

Relative merits of Egyptian and Upland cottons.—There are many reasons for expecting that long-staple cotton, either of the Egyptian or of the Upland type, will become the chief commercial crop of most of the irrigated lands that are now being reclaimed in the Southwestern States. After several years of acclimatization and breeding, improved varieties and cultural methods have been developed which make it possible to produce good crops of high-grade Egyptian cotton in Arizona and southern California, thus opening the way to the establishment of a new industry. Though experiments had shown the Egyptian cotton to be distinctly superior to any of the long-staple varieties previously known, the introduction of the Durango cotton has brought another factor into the problem. Further experiments have become necessary to determine whether the Egyptian or the Durango cotton is best suited to the various irrigated districts.

Elimination of vegetative branches in cotton.—The increased need of earliness or prompt development of the crop to avoid weevil injury is making it desirable to have methods of controlling the development of the vegetative branches or of eliminating them altogether. In order to effect a complete suppression of the vegetative branches, it is usually necessary that the plants be less than 6 inches apart during the early stages of growth, when the vegetative branches would otherwise begin to develop from the basal joints of the stalk. After this stage has passed and fruiting branches have begun to grow, the plants may be thinned to wider distances without inducing the development of vegetative branches.

Leaf-curl injuries to cotton.—Observations on leaf-curl injuries to cotton seedlings show that these malformations are of very general occurrence and cause great damage to the crop. Though hitherto confused with plant-lice injuries, the juvenile leaf-curl is a disorder quite independent of the presence of plant lice. In addition to the obvious effect of retarding the growth of the seedlings, the leaf-curl is frequently responsible for a loss of the terminal bud. This decapitation of the young plants puts an end to the development of the main stalk and results in permanent deformity and backward development. Many of the injured plants fail to produce cotton, and many others set only a few late bolls. Improved methods of thinning are being devised to accomplish the removal of the deformed plants.

Perennial cotton in California.—Attention is being given to the fact that special conditions of climate and soil in southern California make it possible to raise two or more crops of cotton from the same planting, thus reducing the labor and expense of production. Experimental plants of Egyptian cotton grown from the same roots have continued to produce good crops for four or five years. Though the stalks are winterkilled to the ground, the new shoots that are sent up from the roots in the spring grow more rapidly and produce an earlier crop than plants raised from seed. Unfavorable conditions that interrupt the growth of seedlings have less effect upon the development of the overwintered plants and leaf-curl injuries are largely avoided. Investigations are being made for the purpose of improving the methods of cultivation applicable to the overwintered cotton in order to promote earlier and more regular development of new shoots in the spring.

Propagation of cotton hybrids.—The possibility of propagating superior cotton hybrids from cuttings is being investigated in southern California. First-generation hybrids of Upland and Egyptian cotton have been found superior to either of the parental stocks, but deterioration in the later generations prevents the development of hybrid varieties sufficiently uniform for purposes of production. A few hybrid plants grown from fresh cuttings at Bard, Cal., in the season of 1911 were extremely vigorous and productive. This result led to a test of the possibility of carrying cuttings through the winter. Though no special precautions were taken, some of the cuttings that were buried in sand in November remained dormant and were still fresh in May. The next step is to learn satisfactory methods of planting the cuttings, and experiments to this end are now being made.

Behavior of wild wheat in southern California.—An experimental planting of the wild wheat from Palestine in 1910 was made at Bard, Cal., in the fall of 1911. The plants were extremely vigorous and grew to much larger size than under native conditions in Palestine. The number of stalks produced by stooling was also very large, with a dense growth of herbage that may be valuable for forage or grazing purposes. The individual plants were extremely diverse in all their characters. The results indicate that the importation is worthy of further attention.

First-generation hybrids of corn.—The importance of first-generation hybrids as a means of increasing the yield of corn has made it necessary to develop a more reliable and accurate method for determining the percentage of increase resulting from different combinations of varieties. The improved method when applied proved that the hybrid yielded 10 per cent more than either parent, and showed the method of comparison to be sufficiently accurate to detect a difference of 3 per cent.

The value of first-generation hybrids of a drought-resistant Chinese variety of corn has been demonstrated in a yield test made in the season of 1911 at San Antonio, Tex., under extreme conditions of drought. Though the yield of the pure Chinese variety was much less than any of the American varieties, hydrids of the Chinese corn with four American varieties considered most promising for that region gave yields of 20 to 90 per cent more than their American parents.

DRUG-PLANT, POISONOUS-PLANT, PHYSIOLOGICAL, AND FERMENTATION INVESTIGATIONS.

The work of the past year has retained the same general features and organization as during the preceding year, Dr. R. H. True in general charge.

DRUG-PLANT INVESTIGATIONS.

The work with drug plants consists chiefly in the development of the possibilities of producing them and their products in this country. They are now derived in part from foreign sources and in part from our native flora. The preliminary tests are conducted on a small scale at a number of points in order to ascertain the most favorable conditions of soil and climate. Larger experiments on a commercial scale are then undertaken, usually in cooperation with private parties who are able to furnish favorable conditions.

Work at Arlington farm.—The work at Arlington farm under the direction of Dr. Walter Van Fleet has been considerably increased through the planting of many new drug plants and related kinds. A planting of about 40 sorts of roses of types yielding attar of roses or the rose oil of commerce may be mentioned. The blooms of these bushes furnished sufficient material during the past spring for the distillation of small quantities of oil for experimental study. This collection will be increased as facilities for plucking and distilling the petals can be provided. The work on the improvement of belladonna and of other solanaceous drugs through breeding and selection has been continued with very promising results. The material grown at Arlington is verified botanically, thus affording standard drugs of known origin. This collection of growing plants will be made reasonably complete as future development takes place.

It is planned to amplify this work along lines already developed as a testing ground conveniently accessible to the laboratories.

It is planned to continue the Arlington work in its present main features during the next year. The variety of plants under study will be steadily augmented and the necessary increase in running expenses incident to a broader range of investigations will be slight when compared with the greater results obtained.

WORK IN SOUTH CAROLINA.—The work in South Carolina, carried on by Mr. T. B. Young, has been confined, as heretofore, to a small number of trial crops, among which are promising types of peppers. The drought of last season had a depressing effect on pepper growing as well as on other farm activities, but conditions are more promising for the current season. Larger areas are being planted and pepper growing as a side interest seems to be viewed with increased favor. The red-pepper work is sufficiently advanced to show that results comparing favorably with standard crops can be expected. It remains to study the effect of the seasonal variations of different fertilizer formulæ and other cultural details on yield and quality of product. The financial results so far obtained promise to equal those obtained previously with paprika.

During the coming year it is planned to continue the development of red-pepper growing and to bring forward other new and promising special crops.

WORK IN FLORIDA.—The work in Florida, carried on by Mr. S. C. Hood, is chiefly concerned with the camphor investigations. The work on the various plants yielding volatile oils has been pushed forward with the object of getting areas sufficient to demonstrate commercial possibilities. It is hoped that several of the sorts under study will prove to be profitable when grown on the crop basis. The native horsemint and bergamot mint, as well as certain of the Indian oil grasses, may be mentioned.

The work of the coming year will continue to deal largely with plants producing volatile oils. As preliminary tests seem to justify, the work will be extended to small commercial tests.

WORK IN WISCONSIN.—Experimental work in Wisconsin on a large variety of drug plants, carried on by Mr. G. A. Russell, seems to have shown that for many important kinds the rigorous conditions of the North are too extreme for the most favorable results. The work on the utilization of fireweed has been continued. The product has been tested with reference to its use in the plant industry, and has called forth most favorable comments. The extension of the test to put it on a commercial basis is desirable. The installation of shaded beds during the year has widened the scope of the work by making it possible to test plants of woodland origin. The development of the most promising products on a larger scale is necessary to the future utilization of the results obtained on a test basis.

SPECIAL PROBLEMS.

CAMPHOR INVESTIGATIONS.—The camphor work of the past year has been directed chiefly toward increasing the plantings. The unusually rigorous winter seems to have wrought no considerable damage. As soon as the experimental area reaches the desired size, work on methods of cutting and handling the product must be undertaken. The main effort at present is being directed toward securing larger areas of camphor, but experimental work may soon begin on the older plantings, and suitable apparatus for collecting the prunings must be worked out in practice.

VEGETABLE-OIL CROP INVESTIGATIONS.—Laboratory work of a technical nature has been carried on by Mr. Frank Rabak and his assistants, in cooperation with the different branches of field work conducted in relation to a large variety of oils of plant origin. In addition to the products of this class referred to in the report on field work, results may be mentioned which are obtained by working up sources of agricultural waste. The work of the year has demonstrated good commercial values in raisin seeds, which accumulate at packing houses where seedless raisins are prepared. From preliminary investigations on other oil-yielding residues it seems probable that other valuable unutilized agricultural residues exist which may also be made to yield favorable returns. A number of native plants yielding volatile oils have been studied during the year, with good results.

In view of the great interest in vegetable oils now evidenced among manufacturers of soaps, paints, and other oil-consuming products, it is deemed desirable to press actively the investigation of the capabilities of such oil-producing plants as promise well under American agricultural conditions. Accordingly tests on sunflowers, sesame, castor beans, and soy beans are called for. The work on volatile-oil crops and on agricultural residues as sources of useful oils is to be continued in the laboratory and at the stations on a somewhat larger scale, to permit of small commercial tests with promising material. These demonstrations are usually sufficient to enlist the active interest of both farmers and utilizers.

The oil-crop work for the fiscal year 1914 will be undertaken on a much broader basis than at present. The general demand for vegetable oils for a great variety of purposes is large, owing perhaps to the relatively high prices of animal fats and the decrease in production of linseed oil and turpentine. This country is a relatively large importer of this type of products, and efforts should be made to render the United States self-supporting in this respect. To diversify agricultural production in this direction will render good service to American manufacturers.

HOP INVESTIGATIONS.—Dr. W. W. Stockberger spent the early months of the year abroad investigating the hop industry as developed in Germany, Austria, Belgium, and England. He was able to compare and contrast European methods and results with those found in America. He arranged for the introduction of desirable sorts. The field and laboratory work on the improvement of quality and yield of hops in America has been continued, the field methods in use on the Pacific coast being given attention with especial reference to increased yields. The breeding and selection work gives good promise of obtaining superior new varieties. The work on hop constituents in relation to commercial desirability has been continued, the resins and volatile oils having received most attention.

The hop work for the coming year will be continued along the present lines, in order to get the results of the prior work on breeding and improvement. The bearing of present methods of growing hops on yield will continue to receive attention, since important problems along this line remain to be solved. The great importance of a study of the constituents of hops in relation to the market value seems to be clear, and this type of work is required in order to develop a method of judging the value of the product; consequently the work in progress bearing on these problems is to be continued.

TEA INVESTIGATIONS.—The work on the tea experiment was very satisfactory, the result being a large yield of high-grade tea. Dr. Charles U. Shepard, with whom the department is in cooperation, found an increasing demand for more American tea than he was able to furnish. The pruning machine designed by Mr. Geo. F. Mitchell, by its rapid and uniform operation, seems to have become a standard addition to the equipment of the tea plantation. The working out of a picking machine has been begun, with promising results. The perfection of these types of labor-saving machinery is very important, not alone to reduce the cost of production, but also to attain results with promptness and regularity.

The tea work of the ensuing year will continue the development of labor-saving machinery and the study of the relation between weather conditions, methods of cultivation, etc., to tea yield.

POISONOUS-PLANT INVESTIGATIONS.

As heretofore, the investigation of poisonous plants has been carried on chiefly in the grazing regions of the West. Field feeding experiments with plants suspected of being harmful were carried out by Dr. C. Dwight Marsh and his assistants. A temporary camp was established near Baldwin, Colo., with the cooperation of the Forest Service, and a number of suspected plants were carefully studied. It was thought desirable to extend the investigations to include important sources of trouble in southern Montana, and a camp was located near Greycliff, Mont., where suspected plants are found, and work with death camas, lupine, and other species was begun.

LARKSPUR POISONING.—Chief among the plants supposed to cause damage in the mountainous country are species of Delphinium (larkspur). A thorough study of the several species occurring near Baldwin, Colo., was completed, with special reference to the action on cattle. The larkspur situation, as far as the field work is concerned, is likely to be cleared up this year and will receive only incidental attention in the future.

LUPINE POISONING.—Many stockmen have regarded species of Lupinus (lupine) as harmful to domestic animals, an opinion which preliminary experiment seemed in a measure to warrant. This group of plants received attention at the camp in Montana, where a sufficient supply of several species was available. It is probable that the effect of lupine feeding on the various kinds of range animals will be an important feature of the work of the coming fiscal year.

DEATH-CAMAS POISONING.—Another problem believed to be very important deals with the harmful properties of *Zygadenus* spp. (death camas). Some of the most injurious sorts were to be found in the neighborhood of the Montana camp, and a study of this group also was begun. The continuation of this investigation is to be a major feature of the investigations of the coming year.

Cooperation with the Forest Service.—The value of grazing-land areas in the national forests is not infrequently much impaired by the presence of poisonous plants. During the past year this office has been able to point out the obnoxious features of the flora in certain forests and has endeavored to find means of diminishing losses. The Forest Service has greatly aided the investigation and has rendered substantial help in other ways. The cooperative work with the Forest Service on grazing areas of the national forests will be continued, with special reference to certain of the forests in which the sources of loss have not yet been determined.

Laboratory studies.—Laboratory studies on the active principles present in poisonous plants and their pharmacological action have been continued by Dr. C. L. Alsberg and his assistants. Investigations of this nature are necessarily very technical and brief reference only can be given them.

One of the most important problems investigated was that of poisoning by prussic acid developed in sorghum and various wild grasses and other plants. The investigation covered conditions leading to the development of these poisonous properties. The laboratory studies on the harmful principles present in poisonous plants, being of fundamental importance, are to be continued, with special reference to the conditions giving rise to the prussic-acid problem.

Miscellaneous poisonous-plant work.—The supposed harmful action of rubber weed was studied in the spring in New Mexico, where considerable losses of sheep were charged to this plant. Losses due to Amianthium were again reported near Wilmington, N. C., and material collected from the scene of loss yielded a highly poisonous principle which is probably responsible for the harmful result. The identification of suspected plant material is likely to be a constant feature of the work.

PHYSIOLOGICAL AND FERMENTATION INVESTIGATIONS.

Many problems involving the behavior of crop plants and their products arise which demand for their solution fundamental physiological studies. As examples of such problems may be mentioned the keeping qualities of fruits and vegetables as influenced by conditions of production and storage, the growth and productiveness of crop plants in relation to the methods and materials used in feeding them, the effects of all classes of toxic compounds on the physiological activities of the plant, and the nature and cause of disturbances of function seen in physiological ailments such as the mosaic disease. During the past year, work has been begun on several of these problems.

Fruit and vegetable storage.—Work carried on by Dr. Heinrich Hasselbring, in cooperation with Prof. L. C. Corbett, involves technical studies of sweet potatoes before and during storage in order to get an understanding of the fundamental causes affecting their keeping qualities. The importance of this crop is much re-

reduced by the susceptibility of the product to early decay. Somewhat similar conditions exist in relation to other important fruit and vegetable products. The results thus far obtained show that the problems involved are often very complex, but they are of fundamental importance to horticulture.

The work on vegetable storage during the coming year should be carried on with special reference to sweet potatoes, onions, and fruits, dealing in a technical way with the physiological phenomena to be observed before and during storage.

Physiological studies of crop diseases.—Cooperative work on physiological disturbances in sugar beets, cabbage, and spinach has been continued. A technical investigation of the oxidase content of diseased plants in relation to other physiological factors has been carefully carried out by Dr. H. H. Bunzel, who has perfected a method for accurately measuring the oxidase reaction. The application of the method has not only shed light on the diseased conditions mentioned, but has contributed fundamental information on normal plant activity.

The investigations on physiological disturbances of crop plants for the near future will concern chiefly the Irish potato, with incidental reference to other field and garden crops, especially cotton, melons, and cowpeas.

Physiological studies of molds.—The deterioration of grains and other products, accompanied at times with the development of toxic properties through the action of molds, is an important source of loss. Work on the effect brought about in deteriorated maize by several species of molds has been carried on by Dr. C. L. Alsberg and O. F. Black, with the result that a number of metabolic products have been isolated, some of them actively toxic to higher animals. The possible relation of products of this type to diseases usually associated with the consumption of spoiled corn gives unusual interest to these results. The physiological properties of the substances produced by these organisms in the grains or grain products will continue to receive attention.

Physiological study of plant feeding.—The relation of plant growth to a proper balance of the available inorganic salts has been studied by Mr. H. H. Bartlett and Dr. R. H. True, the balance between magnesium and calcium having been given special attention in its relation to peas, asparagus, beets, and other plants. Important relations have been shown to exist, and the surprising effectiveness of minute quantities of these common soil constituents in determining plant growth has been demonstrated. It has also been shown that plants differ greatly in their demands on the soil. It is believed that fundamental studies of the requirements of plants is an important line of investigation which underlies the production of farm crops, and such a series of investigations, undertaken and carried out with regard to the modern teachings of plant physiology, and with the help of the newer laboratory methods, is to be actively pressed. The efforts of the coming year are to be toward cultivating this most important field. It is probable that as faulty nutrition conditions are corrected many diseases of crops may in the end disappear.

AGRICULTURAL-TECHNOLOGY INVESTIGATIONS.

The investigations of problems is agricultural technology pertaining to cotton, field crops, and paper plants have been continued under the direction of Dr. N. A. Cobb.

COTTON STANDARDIZATION.

Official cotton grades.—The preparation and distribution of the official cotton grades has continued throughout the year. The demand for them has increased steadily up to date. Improved facilities made it practicable to reduce the price of a full set first to $30 and later to $25. Generally where the grades were originally placed with schools, colleges, exchanges, warehouses, etc., for the purpose of familiarizing the cotton industry with them, they were finally purchased, and 131 sets were sold during the year. The types are now distributed in 25 domestic States and in England, Germany, France, Italy, India, Brazil, and Mexico.

The work of placing 50 sets of the original standard in vacuum storage, to be used as working duplicates in the future, in order that the integrity of the grades may be preserved, was finished during the year. The 5,400 tubes in which these samples were stored were furnished, evacuated, and sealed under contract conditions that insure adequate vacuum. No such system has ever before been put into effect, and it is probably one of the largest undertakings of its kind ever attempted.

Methods of handling cotton.—The effort to ascertain the additional price that cotton mills can afford to pay for cotton handled in an improved manner has progressed satisfactorily. To this end small lots of cotton were bought in the field and shipped to selected mills in various parts of the country. Pure-strain cotton of known variety was ginned under our own supervision, and the bales were completely covered with burlap. The weight, grade, length, and soundness of the cotton were guaranteed. There were no reclamations, the guaranties with every shipment having proved satisfactory. This cotton has now been spun, and the reports from the mills indicate that from 75 cents to $2 per 500-pound bale additional could be paid by the mills for cotton handled in this way. These estimates are based on the following facts: (1) There is less waste in handling and sampling, as the bales are completely covered; (2) the cotton is more uniform in the bale, hence there is less waste in the mills; (3) a reasonable guaranty of the sort given very much reduces the cost of arbitration; (4) the expenses connected with buying are less.

When the saving in insurance (through the use of completely covered bales) and in transportation (by compressing at the gin) are added it will be seen that these experiments dispel doubt as to the feasibility of introducing very important improvements in the methods of handling cotton. The figures obtained are those of a single season's investigations, which are to be continued so that the results may be checked by data gathered in a succession of seasons and with the object of ascertaining what further improvements are possible.

The usefulness of the method used for accurately determining the length of staple of cotton has been demonstrated. The measurement of samples from various lots of cotton with a view to selecting cotton for use in the preparation of length types is still in progress. These types will range in length from three-fourths of an inch up to 1⅝ inches, by eighths, and during the present year it is expected that much further advance will have been made toward staple standards.

Moisture in baled cotton.—All cotton handled in the investigations already referred to was carefully weighed when first baled and at each subsequent handling, and the history of these bales is very interesting. In general, it may be said that the bales from Texas gained about 10 pounds in weight before they were finally spun. This cotton was picked during dry weather in Waco and milled at intervals of three to five months later in various sections of the country without in the mean time having undergone ocean transportation. As the bales were completely covered and never sampled, this gain of 10 pounds was purely one of absorption of moisture. As far as known, this experiment affords the first systematic record of this kind. The results are very significant and prove that a study of the moisture content of cotton along these lines is very important. Here again these results of a single season are to be supplemented by similar observations to extend over several seasons and to include a greater variety of conditions.

Root-rot cotton.—Advantage was taken of the circumstance that root-rot was prevalent at Waco, Tex., last season to pick and handle a bale of such cotton separately. Other bales of sound cotton were taken, for comparison, from the same field. These bales were made into yarn with the following results: (1) The grade of the root-rot cotton is slightly lower, practically half a grade; (2) the loss in milling root-rot cotton is about 13 per cent as against 10 per cent, i. e., 30 per cent greater; (3) the breaking strength of yarn made from sound cotton is greater, being approximately 94 pounds as against 86 pounds, i. e., about 10 per cent.

These differences are sufficient to justify attempts at classifying cotton in the field. There is no reason to doubt that the separation of poor cotton from good cotton will be relatively just as profitable as the separation of poor fruit from good fruit, or poor grain from good grain, or poor wool from good wool. If this root-rot factor and other factors which reduce the quality of cotton were better known and the cotton classed in the field, the resulting bales of cotton would be of such a character as to command a more profitable market.

Ginning cotton.—Ginning experiments have been continued during the year, and for the first time uniform samples were obtained in sufficient quantity to feed to a commercial 60-saw gin. These samples were obtained in sets of four by placing four locks from a boll of cotton in four separate bags. The tests obtained from these samples are open to none of certain important objections that can be brought against the samples of seed cotton ordinarily used. The results of the tests are in themselves interesting and valuable. The method has proved so satisfactory that it is now being applied in an attempt to define the factors which enter into the most successful ginning, as well as the manner in which these factors affect the grading and standardization.

CROP TECHNOLOGY.

During the past year many interesting and important nematode problems have come to light. The serious potato losses occurring in Nevada have required considerable attention. As a result of cooperative action, publications have been issued and active measures undertaken to cope more adequately with the causal parasite. A second and more thorough reconnaissance in California and Nevada has fully corroborated the opinions formed earlier as to the present distribution of the beet-root nematode.

Study of the nematode fauna of Arlington Farm has made material progress. Many new and interesting forms, both free-living and parasitic, have been discovered.

Soil examinations have been made in various parts of the country to ascertain more definitely the intensity and nature of the nematode population of the soil. New parasitic nematodes, which attack both underground and aerial parts of various plants, and striking facts of life history and of nematode anatomy have been discovered.

Other portions of the work that have hitherto been carried on in the technologic projects have received as much attention as funds have allowed.

PAPER-PLANT INVESTIGATIONS.

In the search for fibers that may serve as substitutes for wood in the manufacture of paper, special attention has been given to a continuation of the studies of cornstalks, of broom-corn stalks, and of rice straw.

Field work.—The numerous lots of materials collected or grown for use in the laboratory and mill experiments included three carloads of carefully harvested cornstalks for food-extract production on a large scale and a ton of papyrus tops imported from Palestine.

As a result of the work accomplished, the conclusion has been reached that materials better suited for special purposes must be found rather than something cheaper than those now in use. In line with this conclusion, more emphasis will be placed in the future on the production of crops especially for paper making.

Laboratory experiments.—Among the digestions made in the laboratory at Washington have been those of sugar-cane pith (a by-product of the diffusion process of making sugar), vetiver grass (a plant which yields a soap-scenting material), *Nolina texana* (a yucca and sotol relative), flax straw, castor-bean stalks, palmetto leaves, hop vines, and papyrus. An attempt is now being made to work out methods of cooking specially suited to each material. Preliminary tests that promise well have been made to determine the suitability of hemp pulp, produced by the soda process directly from retted stalks. Hand-made sheets are prepared from all pulps. A specially constructed pulp screen has been devised which greatly facilitates the work. In all laboratory digestions determinations are made of optimum steam pressure, per cent of cooking reagents, and yields of fiber.

Paper-mill tests.—During the year 54 cooks of soda pulp have been made. Rice straw is a promising material, but the problem of soda recovery must be worked out or methods of cooking must be devised which will make recovery unnecessary. Rice-root grass tops (a waste product of the zacaton root-brush fiber industry) have yielded an especially promising pulp, closely related to that of poplar. The hemp materials are especially promising. The corn-pulp yields were the most satisfactory thus far obtained. Lack of funds prevented the consummation of plans to experiment with pith pulp for the manufacture of paper specialties.

Production of food extract.—Sixteen cornstalk extractions were made in large rotary digesters of 3,000 pounds capacity. Between 800 and 900 gallons of extract were produced, containing about 40 per cent of solids. In cooperation with the Bureau of Animal Industry, the extract was used in feeding 8 milch cows. The experiment was continued over a period of 110 days and gave encouraging results.

In connection with the production of extract a large quantity of pulp was produced. A test of the resistance of cornstalk pulp has been carried on with this material. It was stored wet and unbleached in a drainer and wet down from time to time. After eight months of wet storage, paper of good quality is still being produced from it. The stored pulp has been found to bleach more readily than that worked up immediately after cooking.

Plans for future work.—During the ensuing year especial attention will be given to flax-straw investigations in the hope of finding suitable methods of handling the raw material and of cooking and bleaching the same. Hemp stalks, both retted and unretted, and hemp wastes will receive attention. Other work will include a study of the individual variables in the cooking of different materials and a critical comparison of the celluloses obtained from them. Tests will be made of corn pith for making various pulp products, diffusion methods of extracting food by-products, and soda recovery from rice-straw liquors. Field work with flax, hemp, esparto, and other plants will also be prosecuted.

STUDIES OF PLANT FIBERS.

The investigations of plant fibers have been continued in charge of Mr. Lyster H. Dewey, who at the beginning of the fiscal year attended the first world congress and exposition devoted exclusively to plant fibers. He presented three papers and took an active part in the discussions. The many different kinds of fiber-producing plants growing on the exposition grounds, the great collections of plant fibers, the fine display of fiber-cleaning machinery in operation, and the conferences with men especially interested in fiber-producing plants from all parts of the world afforded exceptional opportunities for gleaning valuable and accurate information.

Hard fibers.—About 3,000 bulbils of *Agave cantala*, the most promising fiber agave of Java and the Philippines, have been introduced and set out in cooperative trials in Porto Rico and on the Florida Keys. Henequen, sisal, and zapupe plants set out in Porto Rico in former years are growing well, and many of them are now ready to yield their first harvest of leaves.

HEMP.—Experiments with hemp demonstrated that the crop can be successfully grown in Wisconsin and that fiber can be prepared in a satisfactory manner by machinery. The interest aroused has caused some 200 acres of hemp to be planted this season.

FLAX.—The work of breeding flax for the development of improved strains for both fiber and seed has been continued. Laboratory tests indicate a distinct improvement in the third generation of selected plants. Experiments regarding the deterioration of fiber strains of flax from American-grown seed have been begun in Minnesota.

RAMIE.—Many requests for information about ramie have been received, and a circular has been prepared for use in answering them. Experiments in the cultivation of ramie under irrigation have been begun in California.

PLANS FOR FUTURE WORK.—The crops of leaves of sisal, henequen, and zapupe will be harvested when ready in Porto Rico and Florida Keys and a study made of the relative merits of several different kinds of hard-fiber plants introduced there. Efforts will be made to induce farmers to increase the cultivation of flax to supply the increasing demand for seed. Experiments with ramie will be carried forward to secure more definite information regarding the production of fiber and possible profits in growing this crop. Plans are being made for the extension of this work to Louisiana and Porto Rico. Further experiments in the cultivation of hemp looking to its introduction into new localities are to be taken up, and seed selection for the development of a more uniform strain will be continued.

GRAIN STANDARDIZATION.

The investigations relating to improved methods of harvesting, handling, transporting, and grading of grain have been continued under the direction of Dr. J. W. T. Duvel. Special attention has been given to corn, wheat, oats, and rice, but studies of other grains, mainly barley, rye, flaxseed, kafir, and milo have been included.

GRAIN STANDARDIZATION LABORATORIES.—Work at six grain standardization laboratories has been continued throughout the year: At Baltimore, Md., in charge of Mr. Laurel Duval; at Chicago, Ill., in charge of Mr. W. P. Carroll; at Decatur, Ill., in charge of Mr. C. A. Russell; at Fargo, N. Dak., in charge of Mr. L. M. Thomas; at Kansas City, Mo., in charge of Mr. E. L. Morris; and at New Orleans, La., in charge of Mr. L. M. Jeffers. The work at the Fargo laboratory, in cooperation with the North Dakota experiment station, has been confined mainly to a study of the milling and baking values of different grades of wheat. At the other laboratories the investigations have been in cooperation with members of the grain trade, grain-inspection departments, and grain transportation and storage companies. Approximately 20,000 samples of grain have been analyzed at the various laboratories, including the one at Washington, during the year. It is felt that the results have aided materially in bringing about a better understanding of grain values and in emphasizing the urgent need of uniform and more definite standards for the grading of grain in all markets.

Grain-handling experiments.—Supplementing the investigations on the natural shrinkage of grain in transit and storage, extensive experiments were made to determine the shrinkage resulting from the handling of different grades of grain under commercial conditions in large elevators. Good progress has been made with the experiments on the handling and storing of artificially dried corn, extensive tests having been made both at Baltimore and New Orleans, where the corn was necessarily dried under very different weather conditions.

Deterioration of corn in storage.—Additional tests have been made to determine the rate and degree of deterioration of various grades of corn under different conditions of storage. It has been shown that excessive moisture is the factor of most importance and that corn containing 19 per cent of moisture is not safe for storage, except during a very limited period in the winter months. Acidity determinations have been made on approximately 5,000 samples of corn, representing all commercial grades and every degree of unsoundness. Chemical analyses show that important changes take place in the composition of corn which has been allowed to become musty, hot, and sour. Indications are that the losses resulting from the deterioration of corn after it is harvested amount to several millions of dollars annually. Arrangements have been made for a series of cooperative tests to determine the relative feeding value of sound and of damaged corn.

American export grain.—The investigations being carried on for the purpose of improving the quality and condition of American export grain, which is now in bad repute in many European markets, have been continued. The results are very interesting, and some of the more important are about ready for publication.

Rice standardization.—Investigations relating to the methods of harvesting, marketing, handling, storing, and grading of rice were begun during the early part of the year. Cooperation on the part of rice growers, dealers, and millers has enabled much progress to be made. It has been shown that as a result of excessive moisture a very large percentage of our commercial rices undergo marked deterioration after they are harvested.

Dockage.—Investigations relating to "dockage," involving the proportion of weed seeds and other screenings in grain, show that a considerable percentage of our small grains would be entitled to a better grade if more attention were paid to proper cleaning at the time of thrashing.

Plans for future work.—Plans are being made for a continuation of the work along the same general lines now in progress. The results relating to corn, intended to establish standards for the commercial grades, may be assembled during the ensuing year. Work with the other grains will be pushed as rapidly as possible and definite standards established in cooperation with the grain trade as soon as the results of the investigations are sufficiently complete to warrant.

The opening of the Panama Canal is certain to result in marked changes in the methods of handling grain on the Pacific coast, and a laboratory in that section is considered essential in order that the department may be in a position to cooperate effectively with the grain trade in meeting these conditions.

BIOPHYSICAL INVESTIGATIONS.

The biophysical investigations, which form a continuation and extension of the work formerly conducted by the physical laboratory, have been carried on during the past year under the direction of Dr. L. J. Briggs.

This work is largely cooperative in character, and at the present time is devoted mainly to problems arising in connection with the growth of crops in arid and semiarid regions. Extensive experiments are being conducted at Akron, Colo., and at other points in the Great Plains, to determine the amount of water required by different dry-land crops for the production of a pound of dry matter. The experiments are conducted in large pots containing over 200 pounds of soil, the surface of the soil being protected in such a way that water can be lost only through the leaves of the crop. About 300 pots have been used in the Akron investigations, supplemented by over 200 pots at other points in the Great Plains, and at Washington. The results show that plants differ greatly in their water requirements, millet and sorghum being the most economical in the use of water, while alfalfa requires four times as much water as millet for the production of the same amount of dry matter. A bulletin upon this subject is now ready for publication.

Suitable apparatus is also supplied to the dry-land and irrigation experiment farms for the purpose of providing a comprehensive record of the climatic and other environmental factors influencing the growth of crops. It is indispensable that such records should include measurements of evaporation, the moisture content of soil, and the rate of growth of the crops, in addition to the usual data of rainfall, temperature, humidity, and wind velocity. Several new stations have been equipped during the year, most of the apparatus necessary having been made in the instrument shop of the laboratory.

A cooperative study has been made of the native vegetation in the Tooele Valley, Utah, on the south side of Great Salt Lake, to determine to what extent the native growth can be used to indicate the capabilities of the land for dry farming. This valley affords an exceptional opportunity for this work, the vegetation often appearing in well-defined zones, occupied in some areas by single species only. It was found that the distribution of native plants was determined by both the alkali content and the soil moisture supply, and that certain plants are reliable indicators of the soil conditions in this region. The results of this investigation are now being prepared for publication.

The investigation of the effect of electrical stimulation upon the growth of plants has been continued, but the weather was too damp to allow satisfactory insulation at the time the plants were growing most rapidly, and the field experiments were inconclusive. The greenhouse experiments, in which the insulated network over the plants was kept charged throughout the night, showed in the case of radishes a depressing effect upon the growth as the result of the electrical treatment. Both indoor and field experiments will be continued this year with improved apparatus.

The electrical resistance method for measuring rapidly the moisture content of grain, developed by this office, has been given an extensive commercial test. About 400 cars of corn from all sections of the corn belt were tested by this method, the measurements being checked by direct moisture determinations. The results indicate that the electrical method of measuring the moisture content of grain will find a useful field in commercial grading. The method is now being put through a similar test with wheat.

FOREIGN SEED AND PLANT INTRODUCTION.

Under the general direction, as heretofore, of Mr. David Fairchild, the work of plant introduction now employs a force of 68 men and women.

Although the number of introduced plant species and varieties has not increased materially, the foreign and domestic correspondence of the office has increased during the past year nearly 60 per cent. This increase in correspondence has come about through the increased interest which is being taken in this country in the previous introductions and the wider appreciation in other countries of the value of this kind of work, causing a demand for information about American plants. The great traffic in plant exchanges, which was predicted when the office was first established, has in fact really begun and tons of plants and seeds of a purely experimental character are being shipped here and there about the world to meet the rapidly growing demand for new crops to test. The 14 years of experience which this office has accumulated through its explorers and hundreds of thousands of tests has given it a somewhat unique position as an international bureau of information concerning the whereabouts of desirable plants. The possibilities of these international exchanges of courtesies, which cost in themselves almost nothing, but which may be of immense value when the plants come into common use in the various countries, warrant their continuance.

A new departure relates to distribution of plants to experimenters, and is calculated to assist them in giving to these trial plants the careful attention which they require. All are familiar with the difficulty of keeping track of their plants. Hitherto only a name or a number has been used and the descriptive data have been kept in a book or among the correspondence files. Hereafter a 50-word synopsis of the uses and origin of the plant, printed on a celluloid label, will be attached to it.

Over 40,000 of these special rare foreign plants were sent out last year, each lot accompanied by specific data as to its experimental value. The coming year this number will be increased probably 50 per cent by reason of increased facilities for the rapid propagation of the new introductions.

AGRICULTURAL EXPLORATION IN SIBERIA AND RUSSIA.—When Mr. Frank N. Meyer had finished the exploration of the Tien Shan region and had arrived at Omsk, he was asked by cable to collect for special experimental use as much seed as possible of the yellow-flowered Siberian alfalfa. He found it entirely out of the question to have this seed collected in ton quantities, but did succeed in getting enough for extensive trials by experiment-station workers. Mr. Meyer imported a quantity of the Siberian bush cherry, a very hardy shrub from western Siberia. He thinks this cherry is peculiarly fitted for cultivation in the home gardens of the colder portions of the country and may prove a very valuable factor in the production of hardy bush cherries for the Northwest. He obtained from a Russian plant breeder a remarkable new large-fruited cherry which has proved productive in a region where ordinary cherries fail because of the great extremes of temperature, and from the same noted originator he received a new apricot which should prove hardier than those now in cultivation in this country. A larch which grows to a great size throughout western Siberia and northeastern Russia and is probably one of the most rapid-growing of all conifers, was imported in considerable quantity. It is a very valuable lumber-producing tree. A species of elm, which makes a remarkably dense shade and is at the same time capable of resisting cold and drought, was imported and will be distributed as a new shade tree for semiarid regions.

Agricultural exploration in India.—Prof. C. V. Piper has made a preliminary survey of the forage-crop conditions of the Dutch East Indies and British India. Although this region has in the aggregate vast numbers of cattle and goats, it is found that forage crops as such are not cultivated, animals being fed on the waste of crops grown for food and on native grasses. Some of these grasses have excellent seeding habits and may prove to be valuable in the Southern States. Incidentally, important information was gathered relating to the mango industry of India.

Exploration of the Egyptian date region.—A special investigation has been made of the date varieties near the mouths of the Nile and of the oases lying near Siut and Aswan. Certain varieties of date which do not require irrigation grow in the sand dunes. Of these and other desirable varieties of date palms 150 offshoots have been imported for trial in the Southwest.

Growth of the plant-introduction gardens.—The plant-introduction gardens, under the direct charge of Mr. P. H. Dorsett, are not testing gardens for the exclusive benefit of the neighborhood in which they are located, but Federal institutions for propagating new plants. These gardens are under the inspection of pathologists and entomologists, and imported material is held as in quarantine under observation a year or more before it is sent out. The great increase in the number of plants to be propagated and the growing quantities distributed have made it imperative to increase materially the facilities at these gardens.

Plant-introduction field station at Chico, Cal.—All the available land at the Chico station is now occupied, and it will be imperative to increase the area next year. It is desirable to extend this station because the conditions for plant propagation are particularly favorable. Over 42,000 plants, representing several hundred different varieties, were propagated last season and are now ready for distribution. Extensive collections of forage cacti, figs, grapes, forage plants, barleys, and corn were also maintained during the year and the greenhouses are filled with collections of mangos and avocados.

PLANT-INTRODUCTION FIELD STATION NEAR ROCKVILLE, MD.—The station near Rockville has been equipped with full facilities for the care of all plant material which is suited to this climate, and plans are perfected for the transfer to the newly erected greenhouses, which cover 6,800 square feet of ground, of all the foreign introductions now propagated in the greenhouses in Washington. Increased land has been rented and an adequate water system, to insure the care of nursery stock during a dry season, has been installed.

PLANT-INTRODUCTION FIELD STATION AT BROOKSVILLE, FLA.—The cleared area at the Brooksville garden has been increased materially. The bamboo grove, which has made a very satisfactory growth and now contains plants 25 feet tall, is rapidly reaching a stage where the utilization of the material will require its distribution. It has been found that small 2-inch cuttings of the rhizomes will take root and in another year it will be possible to distribute through the mail small plants of this timber bamboo for trial throughout the South. Trials of Rhodes-grass have been made at the garden with remarkable success, and 7 acres of dasheen have been grown for trial and distribution. A dwelling for the superintendent and a barn for the tools will be erected the coming year.

PLANT-INTRODUCTION FIELD STATION AT MIAMI, FLA.—Because of the increased demand for new varieties of East India mangos and the better varieties of avocados, the Miami garden has been equipped to turn out as perfect budded plants as possible of these new tree crops. A small greenhouse will be erected next year to protect strictly tropical material from the cold. Attention to the possibilities of the papaya as a dessert fruit has been attracted through a plantation of especially delicious varieties which fruited in nine months from seed. The propagation of this plant from cuttings to insure the perpetuation of the strain is now under investigation. The fruiting of the white sapote and the cherimoya, the remarkable growth made by a tropical eucalyptus from the island of Timor, and the growing of the cajuput tree from Australia in the salt water along the coast are some of the many facts demonstrated at the garden. The small area of the garden and the character of its soil make it advisable to consider the question of extension, so that additional propagating work can be done.

PLANT-INTRODUCTION FIELD STATION AT AMES, IOWA.—The success of the cooperative station at Ames, Iowa, has called attention to the desirability of placing gardens at other State experiment stations, where selected plants adapted to the various regions can be maintained in such a way that they will attract the attention of the students and scientific staff and stimulate them to take up their investigation. Arrangements for a preliminary trial of this plan have been made, and it is proposed to establish such stations wherever cooperative arrangements can be made. The Chinese wild peach, which proved to be hardy when all other peaches were killed to the ground, and the dry-land elm, which has made a remarkable growth at Ames, are two examples of the value of such cooperative work.

PLANT-INTRODUCTION WORK IN SOUTHERN TEXAS.—As heretofore indicated, the work of the garden at Brownsville has required reorganization in order to make it more effectively valuable to the whole region interested and to give it a wider, more general character.

Investigations of the fodder value of the cactus, including a practical feeding test, and experiments with certain fodder crops have been continued. Activities have been directed also toward the organization of a small corps of experimenters and the perfecting of arrangements whereby they can be supplied with new plant material selected because of its peculiar fitness for trial in this region.

Progress of new introductions.—The demand for seeds of the Chinese wild peach for use as a stock indicates that this species is to be given a wide commercial test. The bearing of the Chinese wood-oil tree at several places in the South and the production of over a bushel of fruits by a 7-year-old tree have given a basis for reasonable calculations. These results warrant the attention of paint manufacturers and of cultivators who own large areas of stiff clay land in northern Florida, where the tree thrives. It is worthy of consideration, however, that freight rates to New York via the Suez Canal from 1,000 miles up the Yangtse River are 25 per cent less than from Montgomery, Ala., for instance, to New York. The dasheen has been so successful in the field trials in northern Florida that 7 acres of it have been planted. The product will probably exceed 1,500 bushels and will be largely used for the purpose of making the planters of those estates where it can be grown familiar with its excellent eating qualities. Chinese pistache, a tree of unusual value for shade and street use in the South, has done so well in California and Florida that a demand for seed has developed. The Chinese jujube has fruited both in California and in Texas, and the large-fruited forms serve to emphasize the prospects of this dry-land tree, which is able to stand so much neglect. Candied fruits of American-grown jujubes rank as delicacies. The Tamopan seedless persimmon from China will be ready to send out during the coming season. Mango culture has reached a stage where careful botanical investigations are required to ascertain why the varieties now being grown in Florida are shy bearers. The setting aside of a 200-acre tract of land in Porto Rico as an orchard for the experiment station has necessitated the collection in the Philippines of 10,000 seeds of the Carabao mango, which comes reasonably true from seed. The avocado seems to be acquiring a commercial footing, and a large collection of the best varieties has been transferred from Florida to California for the purpose of supplying the demand for experimental material.

SEED-TESTING LABORATORIES.

The work of the seed-testing laboratories has been continued along the lines of previous years under the direction of Mr. Edgar Brown. The laboratories in Indiana, Missouri, and Oregon have been continued, and laboratories were opened in cooperation with the California and Louisiana agricultural experiment stations. At these laboratories information is furnished as to the quality of farm seeds which are submitted for examination. The results of this work show a material effect in the betterment of commercial seeds offered for sale, as the opportunity for farmers to obtain information concerning the quality of seed they are purchasing acts as an effective check on the seed trade.

The investigation of adulterated seeds carried on during the calendar year 1911 shows a still further decrease in the adulteration of those kinds of seed which had previously been given attention. Hairy-vetch seed was collected for the first time in 1911. Approximately 62 per cent of the 303 samples collected were found to be adulterated or misbranded. Since the work on adulterated seeds was authorized eight years ago the names of 370 dealers have been published as the result of having sold or offered for sale adulterated or misbranded seeds. Of these names, 84 have been published for two years, 23 for three years, 4 for four years, and 1 for five years. The relative number of times which the name of the same dealer has been published for selling adulterated or misbranded seeds shows that the trade is making an effort to put the business on a better basis. At the same time, farmers have been materially benefited by having information as to what firms are dealing in adulterated or misbranded seeds.

Investigational work on methods of germination and related subjects has been continued. Studies on groups of closely related seeds, to determine the characters by which they can be practically and definitely distinguished, have been continued, and results are being published as fast as they are ready. A large number of sets of authentic samples of seeds have been prepared and furnished to schools and persons interested in nature-study work.

The work will be continued practically along the lines which are at present followed, diverting as far as possible the actual testing of seeds from Washington to the cooperative laboratories maintained in the various States. It is planned to increase the number of cooperative laboratories by opening one or two new ones in States where little attention is now being given to seed work and where there is a demand for it.

CEREAL INVESTIGATIONS.

The work of grain investigation has been conducted on the same lines as formerly, but amplified by the establishment of new cereal field stations. The stations at Aberdeen, Idaho, and at Burns, Oreg., are in cooperation with the States. A field station at Biggs, Cal., has been established through cooperation with a local association of grain growers. The stations have been broken and the land prepared for cropping by thorough fallowing. The breeding work in the northern Plains area has been largely expanded by increased cooperative experiments at Dickinson, N. Dak.

Wheat investigations.—Experiments in the improvement and production of wheat have been continued at about 20 field stations, under the supervision of Mr. M. A. Carleton. Breeding experiments to improve the yield and drought resistance of the hard winter wheats have been continued at a large number of dry-land stations. The extension of these wheats into the Northern and Western States, outside of the former winter-wheat area, has progressed steadily through breeding for winter resistance and adaptability. Better spring wheats are being introduced also in the Pacific Northwest, where soft wheats predominate. The durum-wheat industry steadily increases, Kubanka being the leading variety. During the year the difference in price between the durum and common wheats has decreased.

Breeding experiments have been continued at Arlington Farm, Va., where improved strains and hybrids of the eastern winter wheats are under trial.

It is planned to expand and strengthen the work in the humid area of the East and in the dry-land West. Cooperative work in wheat breeding will be commenced on a large scale at the Cornell Agricultural Experiment Station. Work in the Southern States will also be begun in a small way. The standardization of varieties, from the double standpoint of the plant and the seed, is a large and important problem, which will be met by laboratory comparison of abundant material from the various stations.

Oat investigations.—The most important features of the oat investigations, conducted by Mr. C. W. Warburton, have been the experiments in the improvement of spring oats. Breeding work has also been done with winter oats. Resistance to lodging, disease, and unfavorable conditions have been taken into consideration in all of this work.

The plans for future work contemplate continuation and extension along all lines. It is planned to make a collection of oat varieties in order to classify and standardize those now in cultivation and to obtain material as a basis for further breeding work. The experiments will include comparisons of the value of hybrids and straight selections and of the efficiency of continuous selection within pure races. Special attention is to be given to the breeding of oats which may be grown profitably in the South and in the corn belt and to a study of the adaptation of types to climatic and other conditions.

Barley investigations.—The investigations with barley have been in charge of Mr. H. V. Harlan. Active breeding work has been prosecuted at seven points in the North and West. At the Minnesota Experiment Station a number of promising hybrids have been fixed. Early seeding at a greater rate per acre than is customary has been found to have a beneficial effect on quality.

The work is to be continued, with slight increase at all points and a considerable extension in the Great Basin. At the newly established cooperative station at Aberdeen, Idaho, a full breeding nursery will be operated under irrigation and also on adjacent dry land. It is planned to study the effects of irrigation and of the previous soil treatment upon quality; also to test the effect of methods of cropping and of fertilizers upon quality and yield. Greater facilities for supplying requests for seed are much needed. It is planned to interest a number of dependable farmers in the growing of pedigreed barley. Definite work must soon be undertaken in the Northwestern States and in the South.

Rice investigations.—The rice investigations, under the direction of Mr. Charles E. Chambliss, add further proof to the earlier conclusions that irrigation water is extravagantly used, to the detriment of the crop, and that larger yields may be obtained by exercising more care in the selection of varieties and by giving closer attention to the cultural requirements. The experiments are conducted at Crowley, La., and Beaumont, Tex. The rice studies at Beaumont are now conducted in cooperation with the Texas Agricultural Experiment Station. The nursery work at Crowley has resulted in the selection of 19 varieties, which are now being increased for distribution in Louisiana. Progress has been made on breeding for resistance to the disease commonly known as "rotten neck." Further tests in California show that certain varieties can be successfully grown in the Sacramento and San Joaquin Valleys and indicate that rice may here ultimately be produced as a paying crop.

The work of selection and breeding, the studies on the eradication and control of red rice and on rice irrigation and production will be continued, but it will be impossible to increase the scope of these investigations without additional funds. It is proposed to make a special study of the possibilities of the cultivation of wild rice and of the growing of rice without irrigation in certain sections of the Southern States, for the purpose of obtaining another crop that may be profitably used in rotations.

GRAIN SORGHUMS.—Experimental work with grain sorghums, under the direction of Mr. Carleton R. Ball, has been extended. Special attention has been given to the proper rate of seeding necessary to insure the highest yields under different climatic conditions. Cooperation to this end with the manufacturers of planting machinery has shown good results, and it is expected that the leading manufacturers will henceforth be able to supply plates drilled to plant the standard varieties accurately at desired rates.

Field experiments continue to show the superior value of dwarf and early strains. In more northern latitudes or at higher elevations dwarfness and earliness are required to establish the crops; in areas having a long season these qualities permit them to escape or evade the frequently recurring droughts of summer. The dwarf kafir produced at the Amarillo station has been distributed in small quantities, with favorable results, manifested by a large demand. Several hundred acres were grown this year by cooperating farmers, and this variety will be widely established as a field crop.

Early plantings of grain sorghums to escape midge injury gave satisfactory results in the Gulf area. Breeding of improved varieties of broom corn has been continued, and these varieties have been tested at a large number of stations. Some especially good results have been obtained in the northern Plains area in experiments on a small scale. In view of the importance of the broom-corn industry, especially in dry-land areas, and of the enormous shortage of the crop which has just occurred in two consecutive seasons, it is extremely desirable that an appropriation be obtained to conduct the necessary experiments in the culture, harvesting, curing, and marketing of this crop in different parts of the United States.

It is planned to revive and extend the experiments, that were temporarily discontinued because of lack of funds, in the use of grain sorghums for human food. The experiments in breeding early varieties for earliness and cold resistance will be continued. The best dwarf and early strains will be widely distributed in order to increase production in the dry-land areas.

CEREAL-DISEASE WORK.—In the cereal-disease investigations, in charge of Mr. Edward C. Johnson, the following lines of work have been emphasized: (1) The breeding of rust-resistant wheats adapted to the hard spring-wheat belt and a study of the methods and fundamental laws which must be observed in such work; (2) the physiology of rusts, with particular reference to conditions affecting the germination of the uredospore; (3) the improvement of methods of smut prevention and eradication and a special study of the life history of the head-smut of sorghums; (4) the prevention of the straight-head disease of rice, by means of improved methods of irrigation; (5) the relation of imperfect fungi to grain production; and (6) a statistical study of the prevalence of cereal diseases throughout the United States. In continuation of the work along these lines it is planned (1) to extend the breeding of rust-resistant wheats to the winter-wheat region and to increase the resistant types already produced and to test their milling value; (2) to complete and publish the results of the investigations of the head-smut of sorghums; and (3) to test on a large scale such irrigation methods as by experiments may promise effective prevention of the straight-head disease of rice. Later it is planned to undertake (1) an exhaustive study of corn diseases, particularly smut and root parasites; (2) a study of the diseases of flax and the breeding of flax for resistance to wilt and rust; and (3) a demonstration of the feasibility of smut eradication by systematic community effort.

Cereals for the Southern States.—The breeding of cereals has been continued at Arlington Farm, Va., under the direction of Mr. H. B. Derr. This work has progressed along the lines of selection and plant testing of the standard winter varieties now grown in this area and the continued breeding of several new hybrid wheats and barleys.

This work can not be properly done at Arlington for the entire cotton belt, and breeding stations should be established at three or four representative points in the area, on different types of soil. The increasing diversification of crops in the South makes imperative the production of new and suitable cereal varieties for that section. Standardization of varieties already grown is also to be undertaken. Attention will be given to the increase and effective distribution of stocks of seed of the best obtainable varieties.

CORN INVESTIGATIONS.

The work of corn investigation has been continued under the direction of Mr. C. P. Hartley. The object of the work is the determination of the fundamental requirements of the corn plant and the application of cultural and breeding methods that lead to a more profitable production and utilization of the crop. The field work in the Gulf States is directed by Mr. Ernest B. Brown; in the South Atlantic States by Mr. Curtis H. Kyle; in the semiarid and the Rocky Mountain region by Mr. L. L. Zook; and in the Central States by Messrs. J. G. Willier and Fred D. Richey.

Team work on fundamental problems, as agreed upon by the investigators in charge, is producing more conclusive results in much less time than would be possible without such close cooperation among the workers. Experiments covering the same problem and by similar methods, but conducted under different environments, frequently throw light from many viewpoints and permit of better interpretation of results than would be otherwise possible.

SUMMARY OF THE YEAR'S WORK.

The limited appropriation for this work has made it necessary to confine field operations to a very few localities, but the results are of great value in demonstrating what can be accomplished elsewhere.

The object has been to so improve methods of field investigation that scientifically accurate and trustworthy results might be obtained. Results already show the fallacy of the prevailing opinion that methods of corn culture are capable of little improvement. They also show that various changes in methods to suit existing conditions may be made profitable.

The teamwork of the past year has been along general lines. Problems of a local nature have been avoided, as belonging more properly to local experimenters. The results show the existence of fundamental requirements that have been little studied, the supplying of which will result in more profitable production. It is nevertheless necessary to consider local conditions in order to properly supply these requirements.

Cooperative work with breeders' associations.—Field work conducted in cooperation with various associations of corn breeders and corn improvers has made it possible to obtain results under a much greater range of environmental conditions than if such organizations had not borne the expenses. The amount of work that it has been possible to conduct in cooperation with these organizations is sufficient to indicate that vast benefits to corn producers can be secured at little expense by supplying the supervision requested by such associations. The time is ripe for directing into practical and well-tested lines the efforts of the large number of corn improvers that have become tired of exhibition work.

Home-grown seed corn.—The demonstration of the profits of proper selection and preservation of seed corn the past spring emphasizes the possibilities and wide application of such work. Directions for practically applying such features as have passed beyond the stage of investigation and are worthy of general application have been published.

OUTLINE OF WORK NOW IN PROGRESS.

Among the important problems that are being investigated simultaneously in the different sections of the United States may be mentioned: (1) Practical methods of breeding for increased productiveness; (2) influence of heredity and cross breeding upon productiveness; (3) determination of varieties that cross advantageously; (4) influence of seed on productiveness and the determination of methods of seed preservation suited to local conditions; (5) means of planting and cultivating and the choice of implements; (6) practical methods of grading seed corn in order to avoid planting kernels of low productivity; (7) breeding of varieties of better quality for human food; (8) methods of harvesting and storing so as to retain full food value and healthfulness.

The necessity for the concentration of force and funds during the present year on some of these important lines of investigation in order to obtain reliable results required the discontinuance of work in a number of localities.

Work in the Gulf States.—Long continued droughts in 1911 were very disastrous to the experimental work in Texas. Complete failures resulted at many points, and in some instances no experimental data could be obtained. In tests of surface and furrow plantings increased yields and decreased number of suckers were obtained by the furrow method. The work along these lines leads to the opinion that the advantages of one method of planting over another are largely determined by local conditions of soil, topography, and season.

Cooperative variety tests were conducted with farmers in Louisiana and Mississippi. Increased yields and more profitable crops are resulting from closer attention to methods of planting, of cultivation, and of harvesting, and to the use of better seed corn.

Work in the South Atlantic States.—The work in the South Atlantic States may be set forth in the following study headings: (1) Importance of local adaptation (a systematic study of 10 local varieties); (2) search for varieties which when crossed give first-generation crosses that are more productive than either parent (14 local varieties involved); (3) relation between the specific gravity and the productiveness of seed (15 varieties involved); (4) reasons for the variations in the specific gravity of seed; (5) relation of yield to the climate in which the seed is stored; (6) relation of yield to the rate of stalk growth; (7) comparison of furrow planting and level planting.

Work in the semiarid and the Rocky Mountain regions.—In breeding and selecting for increased production in the semiarid and Rocky Mountain regions especial attention has been given to the problems of drought and heat resistance. A large number of varieties from various localities in the United States, as well as varieties introduced from Mexico, Central America, and other countries, have been under observation and trial. Several of the Mexican introductions have shown superior adaptability for the extreme Southwest. No relation has been observed between type of plant and its drought or heat resisting powers. As a rule, plants that have been grown longest in any locality withstand best the adverse conditions found there.

Work in the Central States.—Tests of a large number of crosses of various varieties have revealed one cross which has proved much more productive than either parent. This First Generation Cross 182 is being compared in productiveness with local varieties in cooperation with about 600 farmers. In Wisconsin, South Dakota, and Nebraska the growing of earlier maturing varieties and earlier fall selection and proper preservation of seed have been productive of most profitable results. Cooperative variety testing has shown the superiority of adapted and acclimated strains.

PLANS FOR FUTURE WORK.

It is highly advisable that the corn-breeding and field-test work be continued at each of the 24 points where it has been conducted for several years in order to ascertain whether the methods which have given increased yields are capable of affording still greater improvement. Experience has rendered cooperators more proficient, and the profitable results obtained have aroused their ambition to do more and better work. It is also advisable to extend to other localities corn-improvement work along the lines which have proved so effective, but which will encounter local problems that the farmer can solve only by cooperative assistance and the encouragement that follows success.

The notion that everybody knows all about how to grow corn is rapidly giving way to the idea that our greatest wealth-producing and most universally grown crop has never received sufficient study and is capable of much greater returns when its requirements are understood. The lines of corn-improvement work that can be cooperatively conducted to the certain benefit of the farmer involve such slight comparative expense that funds can scarcely be expended more effectively for the general prosperity of the country.

FORAGE-CROP INVESTIGATIONS.

The investigations of forage crops are under the direction of Prof. C. V. Piper, but in his absence during part of the past fiscal year the work was carried on under the supervision of Mr. R. A. Oakley. The general plan of these investigations remains the same as heretofore, namely, intensive studies of the most important forage crops and the testing of numerous new introductions in the search for better forage crops for the South and semiarid regions.

Alfalfa investigations.—The main lines of work with alfalfa in the East for the past year have included a close study of cultural requirements with special reference to fertilizers and treatment for yellowing. The condition of yellowing usually affects the second and third crops, and in many fields seems to prove permanently injurious to the stand. Relief appears to be through the use of fertilizers and cultivation.

The work with alfalfa in the West has been confined largely to the testing of hardy strains, investigations of alfalfa in rows for seed and hay production, and the testing of the effect of cultivation on broadcast stands. In the extreme Southwest the use of varieties making a quick growth has been encouraged. The Peruvian variety is the best example of this type. In the development of hardy strains the best forms of the yellow-flowered species are being utilized, chiefly for the creation of new varieties by hybridization with common alfalfa. The growing of alfalfa in cultivated rows for both hay and seed has given such promise in the West that every effort is being made to encourage this practice.

In future work in the East it is proposed to give the most attention to the treatment of alfalfa fields to prevent yellowing. Tests of fertilizers for alfalfa will be continued as heretofore. Unless satisfactory treatment for yellowing has been developed before 1914, work on that factor which now limits alfalfa production will be continued.

In the West the plats established during this season will yield results in regard to the effect of cultivation on broadcast fields and the growing of alfalfa in rows for seed and hay production. This work will be continued on a larger scale. Small quantities of the improved hardy strains developed by hybridization will be available for increasing stock, and it is planned to give these lots especial attention. It is proposed to institute a series of field experiments in order to reduce the percentage of winter killing of common alfalfa through cultural methods, the work now being conducted on small plats.

CLOVER INVESTIGATIONS.—The present extreme scarcity and high price of red clover seed are seriously handicapping the extension of this crop throughout the country. Attempts are being made to relieve this condition in three ways: (1) By determining the factors which are necessary to produce large crops of seed in order to bring these factors under control as far as practicable; (2) by developing heavy-seeded strains through selection at cooperative testing stations; (3) by supplying the proper conditions for germination in order that the minimum rate of seeding may be sufficient.

Tests are under way to determine the effects of seeding at various rates, different depths, and in rows of various widths. The production of successful stands of clover is coming to be more and more difficult in many sections of the country. Observations indicate that the principal reason for this condition is the gradual depletion of humus in many soils. In some sections the addition of either phosphorus or potash and lime have remedied the difficulties. Other soils need drainage before red clover can be produced successfully.

The customary high price of crimson clover seed has also been a serious handicap to the extension of this crop. Preliminary experiments looking to the economizing of seed indicate that by drilling instead of broadcasting satisfactory stands can be obtained with much less seed to the acre. The use of wheat, winter oats, winter barley, or rye with crimson clover in mixtures is proving very successful. Tests are under way to determine to what extent the use of early-maturing and late-maturing strains of crimson clover will extend the harvest season, thus enabling the farmer to handle a correspondingly greater acreage with his customary equipment.

The work as outlined for the past fiscal year will be continued with no essential changes.

GRASS INVESTIGATIONS.—Grazing experiments conducted in cooperation with the Virginia Agricultural Experiment Station at Blacksburg, Va., are being continued. This work has reached the stage where definite results have been accomplished, and a change can now be made to include additional points. Experiments along the line of improvement of pastures by reseeding, eradication of weeds, and the use of fertilizers are being conducted in Virginia, in New York, and in the New England States.

The breeding of timothy and other grasses at New London, Ohio, has been continued and extended. More than 600 timothy selections and approximately one-third of this number of other grasses and clovers are under observation. Especially valuable strains of timothy sown in small plats promise to produce sufficient seed for field tests during the coming season.

Field tests of Rhodes-grass are being conducted in Florida in order to determine its climatic and soil requirements and the yield of hay which may be expected. One field of 20 acres has been established near Brooksville, from which results on a commercial scale are expected.

Sudan grass, which is very closely related to the cultivated sorghums, is proving even more promising than it did last season. This grass is an annual, but it can be grown so satisfactorily that it promises to replace millet and even sorghums in many localities. It is valuable not only for the South, but also for many of the Northern States.

In planning for future work, it is proposed to modify the definite grazing experiments at Blacksburg, Va., to include the testing of commercial fertilizers in combination with cultural treatment of pastures and to duplicate the original experiments for the purpose of having a definite check on the results obtained. The facilities for developing and testing improved strains of timothy at New London, Ohio, are inadequate for the needs of the problem as it develops, and it is planned to lease an additional tract of land especially for increasing the stock of improved strains, the present station to be used for selection work and row testing. A study of cultural methods in connection with the growing of Rhodes-grass and Sudan grass will be conducted in the South, and efforts will be made to have seed of these grasses available in every section where they are promising.

Cowpeas.—The testing of newly bred and introduced cowpeas is being continued on a large scale. Several of these new kinds promise to be superior to standard varieties. One of especial promise named Early Buff is not only very prolific but much earlier than any variety yet tested—a matter of importance, as it will encourage the growing of seed farther north than at present.

Vetches.—In the last five years the culture of hairy vetch has increased greatly, and the price of seed has been advanced to nearly a prohibitive figure. As seed has been grown successfully in many States, there is no good reason why a domestic supply should not be produced in sufficient quantity.

Several newly introduced species have shown high promise in comparison with hairy and common vetches (among them purple vetch and woolly-podded vetch) and the Tangier pea. Experiments conducted in western Oregon during the past three years show that seed of all of these species can be produced about as cheaply as common vetch.

Sorghums.—Investigations of the sorghum crop are being conducted mainly at Chillicothe, Tex., and Akron, Colo. Among the varieties recently introduced Feterita and White Amber have proved in three years' trial to be worthy of general introduction. Both are very early varieties and can be matured throughout most of the dry-land area.

Soy beans.—Interest in soy beans both for forage and for oil production continues to increase. In connection with the intensive investigations into the culture and improvement of this crop the oil content of each variety is being determined. On account of the interest in the crop in the States where the standard varieties will not mature especial attention is being directed to the earliest varieties, including many from Manchuria.

Velvet beans.—About 25 species and varieties of velvet beans have been imported from various places in southern Asia and are being carefully studied and tested in comparison with the Florida velvet bean at Biloxi, Miss., and elsewhere. Two of the most valuable are the Yokohama bean from Japan and the Chinese velvet bean, especially as they are much earlier and more prolific than the other sorts.

Plans for future work.—The lines of work with all of the above-mentioned forage crops will be continued as vigorously as resources will permit. It is very desirable, however, to carry on the work at a larger number of places and in cooperation with existing stations wherever practicable.

TOBACCO INVESTIGATIONS.

GENERAL FEATURES OF THE WORK.

Experiments and demonstrations in tobacco production, under the direction of Dr. W. W. Garner, have been conducted in Kentucky, Texas, and other States herein mentioned. The more general features of the work are the improvement in yield and quality of the crop by breeding and selection, combined with systematic variety tests, experiments, and demonstrations in methods of fertilizing tobacco and in systems of crop rotation especially adapted to produce maximum yields of tobacco consistent with the necessary quality of the product. In connection with the breeding work a study is made of the effects of environment on the growth and development of the tobacco plant and on the quality of the cured leaf.

Because of the fact that the tobacco industry is based on a large number of distinct types, each requiring special methods of production, temporary field stations are located in the principal districts, and these stations furnish facilities for practical demonstrations of improved methods which result from the direct local tests. The more important problems are gradually being worked out and the results placed directly before the tobacco growers in effective object lessons.

INVESTIGATIONS IN CIGAR-TOBACCO DISTRICTS.

Work in the Connecticut Valley.—Important results are now being obtained from the breeding investigations which have been in progress during the past few years relating to definite principles and methods applicable to the improvement of the standard varieties of tobacco, and these results in part have been published. The practical work of developing a new type for the Broadleaf section has been continued, and the original cross of Broadleaf on Sumatra is now in the third generation. It has been demonstrated that the use of artificial heat during the curing of cigar-wrapper leaf not only prevents damage from pole-sweat, but also gives better colors.

Work in New York.—The fertilizer and crop-rotation experiments in the Onondaga and Big Flats districts have demonstrated that the yield of tobacco can be increased markedly by the proper use of commercial fertilizers to supplement the stable manure, on which growers have heretofore depended almost entirely. The use of hairy vetch and other winter cover crops for tobacco lands has given excellent results.

Work in Pennsylvania.—The work of developing more productive strains of Broadleaf for the Lancaster district has been continued, and seed of the more promising strains has been placed in the hands of growers. Tests during the past two years have shown that increased yields can be obtained under proper conditions by topping the plants higher than has been the custom. Cooperative experiments to increase present yields of filler tobacco by the use of phosphates as supplemental to barnyard manure have been undertaken.

The tobacco work has been extended into the Clinton-Lycoming district, where present methods of tobacco production are poorly developed with respect to the use of labor-saving machinery, methods of fertilizing the crop, suckering, harvesting, etc.

INVESTIGATIONS IN MANUFACTURING AND EXPORT TOBACCO DISTRICTS.

WORK IN MARYLAND AND VIRGINIA.—The new types of tobacco recently developed and distributed in Maryland are becoming very popular with the growers, being decidedly more productive than the ordinary types. A third new type, which gives promise of outyielding any of those previously produced, is being fully tested this year. The fertilizer and crop-rotation experiments have been continued. The most striking feature of these tests has been the marked response of the tobacco soils to an increase in the humus supply, more particularly the increase in yield as a result of liming the soil and growing crimson clover as a cover crop. Tests of short systems of rotation specially adapted to the choice tobacco lands have been taken up. In Virginia the more important lines of work, which have been in progress during the past few years, are now nearing completion. The work at the local stations in each of the three principal tobacco districts has been liberally supported by a special State appropriation and has been eminently successful in inducing many farmers to adopt more intensive systems, better methods of fertilizing the tobacco crop, and systematic rotation of crops.

WORK IN KENTUCKY.—A special feature of the work in Kentucky has been a systematic test of nearly all the standard varieties of tobacco in the Burley district and in the Hopkinsville district, and seed from pure strains of the best varieties will be available for distribution next year. Experiments in curing Burley tobacco with artificial heat are being inaugurated this year. The fertilizer tests at Hopkinsville have been continued, and good progress is being made in working out the fertilizer requirements of the tobacco crop in that section.

WORK IN NORTH CAROLINA AND SOUTH CAROLINA.—Experiments are in progress at Reidsville, Oxford, and Greenville, N. C., and at Timmonsville and Manning, S. C. The work at these stations includes the production of improved varieties and strains by breeding and selections, fertilizer and crop-rotation tests, and demonstrations and experiments in improved methods of flue curing. Special attention is being given to the problem of increasing present yields of bright flue-cured tobacco without impairing the quality. Undoubtedly the key to the situation lies in increasing the humus supply in these run-down soils, but the matter is complicated by the fact that legumes grown in rotation with tobacco tend to injure the quality of the leaf.

PLANS FOR FUTURE WORK.

The more general features of the work already outlined are of such a nature as to require several years for their completion, and it is planned to continue the investigations along essentially the same lines. The principal features of the work in Virginia will be closed up at the end of the present fiscal year, in order that funds may be available for taking up investigations in the dark fire-cured district of Tennessee, with headquarters at Clarksville. The work at that point will be along the same lines that are followed at Hopkinsville, Ky., including the development of pure strains of the best standard varieties, a study of the fertilizer requirements of the tobacco crop, and systems of rotation specially adapted to tobacco culture.

PLANT-NUTRITION INVESTIGATIONS.

The investigations of plant nutrition in charge of Dr. W. W. Garner have to do with special problems of a broad nature, not pertaining primarily to any particular crop plant. The principal feature of the work now in progress relates to a quantitative study of the comparative effects of some of the principal factors of nutrition on the growth and development of plants. The work includes laboratory, greenhouse, and field studies, and the facilities at the Arlington farm are largely utilized in obtaining material for experimentation.

Relation of nutrition to the composition of plants.—The investigations in progress deal with the oil content of crop plants as affected by nutrition. The more general features of the work have been largely completed and will soon be ready for publication, but additional data are yet to be gathered as to the relative influence of some of the primary factors of nutrition, considered singly, on the formation of oil in the plant. The data already obtained are based on studies of soy beans, cotton, peanuts, and flax.

Leaf development as affected by nutrition.—A study of the effects of the principal factors of nutrition on the physical characters, such as size, shape, and thickness, has been undertaken. Inasmuch as the structure and composition of the leaf of tobacco are known to be readily influenced in these particulars, this plant has been used in the investigations. Very striking results have already been obtained.

ALKALI AND DROUGHT RESISTANT PLANT BREEDING.

The breeding and physiological investigations of plants in relation to alkali and drought have been continued in the arid and semiarid portions of the United States under the direction of Mr. T. H. Kearney.

Breeding for drought resistance.—The object of the breeding work in charge of Mr. A. C. Dillman is to develop profitable varieties of crop plants possessing the greatest ability to withstand drought. Improved strains of alfalfa, sorgo, millet, and awnless brome-grass, well adapted to dry farming in the northern and central portions of the Great Plains, have already been developed. These strains are being compared in order to ascertain which strain of each crop is best adapted to withstand drought. Pending the results of these tests, seed of the strains of known superiority is being increased for distribution.

Physiology of alkali and drought resistance.—Cooperative investigations in charge of Dr. H. L. Shantz relate to the ratio of water used to weight of dry matter produced by plants. Many crop species and varieties grown in the semiarid regions have been compared under carefully controlled conditions, in order to ascertain their relative water requirements. The results prove that, other things being equal, the plants which have the lowest water requirement are best adapted to crop production in regions of deficient rainfall.

The methods developed in the physiological investigations of drought resistance are being applied in studying the related subject of alkali resistance. Preliminary results indicate that the presence of an excess of alkali salts has no effect upon the wilting coefficient of a given soil. On the other hand, the results indicate that the water requirement of the plants is increased by the presence of alkali. The methods developed by these physiological investigations are being practically applied in studying the effects of alkali and of a deficiency of soil moisture upon the growth of orchard trees in irrigated sections of Colorado and California.

Indicator value of native vegetation.—A cooperative investigation has been conducted in a limited area in central Utah to establish definite correlations between the moisture capacity, normal moisture content, and salt content of the land, on the one hand, and the composition and character of the native growth on the other. The results warrant the belief that the native plants can be used with considerable precision, in this portion of the Great Basin region at least, in determining what areas are best adapted to dry farming and also what areas are characterized by the presence of alkali in sufficient quantity to injure crop plants.

Egyptian cotton breeding.—Seed of the Yuma variety, an improved type of Egyptian cotton developed in the course of this work and adapted to growing under irrigation, has been distributed to farmers in Arizona and California, with the result that a good stand has been produced upon an acreage sufficient to insure a thorough practical test of this variety. Another very promising variety, the Sacaton, is also being tested on a commercial scale.

Plans for future work.—It is planned to continue the work during the fiscal years 1913 and 1914.

INVESTIGATIONS IN ECONOMIC AND SYSTEMATIC BOTANY.

The investigations in economic and systematic botany and range work have been continued under the direction of Mr. F. V. Coville.

The experiments looking toward the domestication of the blueberry, the first results of which have already been published, have been continued along the lines thought to be essential to a proper foundation for a blueberry-growing industry. It has been found that seedlings grown from very large-berried bushes produce small berries oftener than large ones and that budded and grafted plants continually send up new and objectionable shoots from the stock. The desirability of devising some method of propagation by cuttings is therefore obvious. The problem proved so difficult that an elaborate study was necessary before the various causes of failure could be understood and eliminated. Three successful methods of reproducing blueberry plants have now been devised. Berries exceeding eleven-sixteenths of an inch in diameter have been grown in the greenhouse. The search for other and still better wild stocks con-times, the largest berries having been found in the pine barrens of New Jersey and in North Carolina.

Investigations in cooperation with the Forest Service to determine the best means of maintaining the grazing lands in the national forests in a condition of maximum productiveness have been continued.

Nearly 3,000 specimens have been added to the economic herbarium. The usefulness of this collection is constantly increasing.

A manuscript containing descriptions of the native American plums and a classification of their cultivated forms, by Mr. W. F. Wight, has been completed. Botanical revisions of other groups of horticultural plants are now in progress, as follows: (1) A study of the custard apples and their allies, by Mr. W. E. Safford; (2) the bur clovers, by Mr. P. L. Ricker; and (3) Philadelphus and related genera, by Mr. A. H. Moore.

The study of the grasses of California has been completed by Mr. A. S. Hitchcock, and the results have been published. An investigation of the grasses of Central America, necessary to the acquirement of a proper knowledge of our tropical possessions, including the Panama Canal Zone, has been begun. A preliminary report on the grasses of Mexico is nearly ready.

FARM-MANAGEMENT INVESTIGATIONS.

The organization of the Office of Farm Management has been slightly rearranged, under the direction of Prof. W. J. Spillman, to meet the additional demonstration work that has been placed upon it.

FARM ECONOMICS.

Farm cost accounting.—In order to be able to give closer supervision to the work and thus secure greater accuracy in the cost of each operation on the farm, the cooperating farms have been centralized, where practicable, into groups of 14 to 30 each, with a man in charge of each group. Since the accuracy of an average increases in direct proportion to the number of included items, other methods of gathering cost data are being tested in order to acquire a maximum number of records at a minimum cost. Methods of farm bookkeeping have been worked out and published.

Farm-management surveys.—The initial survey work covered all the farms in four townships of southern New Hampshire. During the past year similar surveys have been made elsewhere in New Hampshire, in Maine, in Indiana, in Illinois, and in Iowa. A total of 1,200 records was obtained, about half of which were from tenants and the others from owners of farms. Analysis of the figures obtained from the corn-belt States just mentioned shows that the ordinary tenant farmer in the townships surveyed receives an income in direct proportion to the capital invested and the area of land farmed, and nearly twice as great as that of the farm owner. The results also show that those farms whose source of income is from live stock afford much larger labor incomes than those whose main revenues are from the sale of crops.

History of farm management.—A careful study of the literature available relating to farm management during ancient and medieval times is being made with a view to summarizing for publication such of it as may be of use to modern farmers.

Farm equipment.—Data have been secured for several localities showing the investment and its distribution in the various classes of permanent and movable equipment, including the investment in live stock and machinery, the cubic space per acre and per farm for dwellings and other buildings, and the power requirements for farms. Provisional labor standards for all of the common farm operations, with varying sizes of crews and equipments, have been worked out for average conditions.

Marketing farm products.—A beginning has been made in the study of the methods used in different parts of the country in preparing farm products for market, the effect of these methods on prices received, methods used in transportation, methods of organization and conduct of cooperative marketing associations, the distribution of enterprises in their relation to market centers, the differences in prices received by the producer and those paid by the consumer, and the reasons for these differences.

Farm credit.—There is general interest in the establishment of systems of farm credit that may be applicable to conditions prevalent in various sections of this country. A preliminary study has been made of the various systems now in use in other countries, especially in Europe. A systematic study of this subject as it applies to this country is now in progress.

Farm insurance.—A study is being made of the subject of farm insurance, especial attention being given to cooperative insurance associations. Such organizations have been found to be more numerous and more successful than was anticipated when the study was begun.

SPECIAL FARM-MANAGEMENT STUDIES.

Tenant farming.—The subject of tenant farming is being studied with special reference to the contract between owner and tenant. Where tenants have assurance of long tenures, it has been found that they frequently furnish at their own expense many of the permanent improvements, such as fences and farm buildings, and usually adopt a system of farming that will maintain and often improve soil fertility. Data now on hand from a large number of tenant farms is being analyzed for the purpose of finding the most satisfactory division of the proceeds between labor, working capital, and investment in real estate. This study has already revealed certain general principles that enable the office to offer valuable suggestions concerning the details of lease contracts.

Weeds and tillage.—The relation of weeds to the tillage requirements of cultivated crops has been studied during the past seven years in cooperation with certain experiment stations and farmers. The results are important. Closely related to this subject in the South is that of hillside terracing, which has been given special attention.

The study of the use of herbicides in the destruction of weeds has shown that where it is desirable to kill all vegetation, as in such situations as driveways, railroad tracks, etc., common salt, arsenite of soda, and petroleum products are satisfactory.

Making and utilizing hay.—Experimental work in the artificial curing of hay has progressed so satisfactorily that those in charge and the farmers of the locality who have had a chance to observe are convinced of its practicability on the farm. A new drier is to be constructed which will embody such improvements as experience has found to be necessary, and a special effort will be made to ascertain the cost of curing hay by artificial means.

Utilizing and maintaining pastures.—The cooperative work begun last year in Maine, Massachusetts, and New York for devising means of renovating worn-out pastures has been continued as previously outlined, with promise of practical results.

Sugar-beet growing.—Cooperative studies of systems of farming wherein sugar beets enter as a commercial product have been made in many of the Western States.

Clearing and utilizing logged-off lands.—An attempt will be made to gather data as to the relative cost and difference in methods of clearing land having various types of soil and different kinds of timber. It is planned to continue this work during the coming year in Michigan, Wisconsin, and Minnesota.

Relation of farm practice to yields.—That crop yields are affected by the type of farming practiced is well known. Very little effort has been made to systematize the scattered data that may be available. For the past seven years experimental work has been conducted in cooperation with the Maryland and Kentucky stations, the object being to secure experimental data on this subject which might serve as a check on the figures that are rapidly accumulating as a result of the study of farm practice. The work at the Maryland station was discontinued, but it will be continued in Kentucky. The tabulation and analysis of the figures obtained from actual practice has been started and will be pushed during the coming year.

Geographic factors.—A study of the relations existing between the distribution of farm enterprises and such geographic factors as seasonal rainfall, the length of the growing season, the dates of the last frost in spring and the first frost in the fall, topography, elevation, latitude, geological formation, and character of soil is being made.

Cactus investigations.—A special effort has been made to concentrate the collections of cacti that have accumulated in southern Texas and California, in order that they may be more readily available for breeding purposes. Culture tests have been continued with the spiny native forms in southern Texas. It has been demonstrated that these plants can be successfully grown as forage and that they yield large crops under proper cultivation. Another large public distribution of eight varieties of spineless forms was made in the spring of 1912, about 16 tons of cuttings being sent out.

Range investigations.—Attention has been directed to the production of winter forage on the sheep ranges of the Southwest, the relative conditions governing the grazing of sheep and cattle and the methods of management of the range by different ranchmen in various sections. The Santa Rita Reserve in Arizona is beginning to give valuable data regarding the reestablishment of depleted ranges. At the request of the Secretary of Agriculture a large range reserve has been set aside for the purpose of securing data regarding the carrying capacity of the ranges in southern New Mexico. It is expected that these data will be on a scale large enough to be applicable to the State.

Alaska reconnaissance.—Additional study has been made of the agricultural possibilities of Alaska. Visits were made to the valleys of the Chitina, Copper, Chilkat, Yukon, and Tanana Rivers and other points along the coast and in the interior. Careful notes were made (1) of the kinds of stock and crops that have proved successful on homesteads and at experiment stations; (2) of the differences in soil, climate, and geographic conditions; (3) of the methods employed in preparing the soil for planting; and (4) of the relative chances for success as governed by transportation facilities, markets, prices obtainable for products sold, and the prices paid for supplies that must be bought. The reports now on file form a good basis for future investigations in Alaska.

FIELD STUDIES AND DEMONSTRATIONS.

Farm practice.—Studies are being made (1) of the types of farming that have developed in the various agricultural sections of the country, as related to the principal kinds of soil; (2) of the cropping systems in vogue on the various types of farms; and (3) of the methods used by the most successful farmers who practice each type of farming. This information, obtained directly from the farmers themselves, has been widely in demand, and the men engaged in the investigation have been constantly importuned to aid in dealing with specific problems, as to suggest working plans for farms, etc.; to deliver lectures at farmers' institutes; and to conduct demonstrations and other forms of extension work. Increased appropriations will be necessary in order to meet this constantly increasing demand. Briefly, the plan under which this work is being developed outside of the Cotton States is as follows:

As rapidly as possible county agents, whose business it is to become thoroughly conversant with the local conditions and problems, are being placed in charge of local work. Their duties are (1) to learn the various types of soil and the types of farming that are most successful, (2) to be ready to advise the farmers in regard to the available literature applicable to the locality, (3) to interest investigators who are in charge of work along lines in which the farmers of the locality are interested, (4) to conduct such demonstrations and give such object lessons as may be advisable, and (5) to aid in every way to bring to the farmers of the locality the help or information they may need.

The counties are grouped into districts of not more than 10 each, with a supervisor in charge of each district. The supervisors in turn report to a State leader, who has general supervision of all the work in the State. The States are grouped into districts of two or more each, with a district leader in charge. These leaders in turn report to a division leader, who has headquarters in Washington. The organization within each State is being maintained on a cooperative basis either with the State institutions or with county organizations, farmers' organizations, or such commercial organizations as may be interested.

The results of this cooperation have been highly satisfactory, and wide-spread interest in this work is manifest in all parts of the country.

BOYS AND GIRLS' CLUB WORK.—The work of the boys and girls' clubs is also being extended along the same lines as those that have proved so successful in the Cotton States under the late Dr. S. A. Knapp. Cooperative arrangements for corn-club work have already been made with eight States, with an approximate enrollment of 20,000 boys.

FARMERS' COOPERATIVE DEMONSTRATION WORK.

GROWTH AND EFFICIENCY.

The cooperative demonstration work among farmers in the South under the direction of Mr. Bradford Knapp has had continued growth in magnitude, influence, and efficiency. As a method of taking definite agricultural information directly to the farmer, the work has more than ever proved successful.

Agents have been placed in many additional counties in the various Southern States and the work continued in all old territory. Nearly 50,000 more people, of all ages, were receiving direct instructions from the department through this work at the close of the last fiscal year than at the close of the year previous. The enrollment at the end of the fiscal year just passed was as follows: Adult demonstrators and cooperators, 100,703; boys' corn-club members, 67,179; girls' canning and poultry club members, 23,550; members of boys' cotton clubs, 4,690; members of boys' Kafir-corn clubs, 1,361; total, 197,483. The work reaches indirectly a larger number than those formally enrolled.

The number of field agents employed at the close of the year was 858, an increase of 277 over the previous year. Of this number 13 are State agents, 36 district agents, 20 corn-club agents, 639 local agents, and 159 collaborating agents engaged in work pertaining to the girls' canning and poultry clubs.

RESULTS OF THE WORK.

For the season of 1911 detailed reports were received from 13,641 demonstrators reporting on 109,999 acres of cotton and from 12,390 demonstrators reporting on 66,880 acres of corn. Much more land was cultivated according to instructions than these reports covered; thousands of reports showing large yields were rejected because they were in the nature of estimates. On demonstration farms the average yield of cotton was more than 75 per cent greater and of corn more than 110 per cent greater than the average yield for the entire States as shown by the figures of the Bureau of Statistics.

COTTON DEMONSTRATIONS.—Especially noteworthy are the results on cotton demonstration farms in boll-weevil territory. The heaviest infestation and consequent damage from this source was in Louisiana and Mississippi. In each of these States the average yield on cotton demonstration farms was more than 100 per cent greater than the average for the State as shown by the figures of the Bureau of Statistics. In hundreds of instances the reports show that the yield on demonstration farms was from 100 to 600 per cent greater than on adjoining farms where the instructions of the department were not followed. As in former years, demonstrations in many localities were conducted on large acreages, and high yields were obtained on farms ranging from 100 to 1,000 acres in size.

A practically complete restoration of confidence in ability to grow cotton successfully under boll-weevil conditions has followed as the result of demonstration work in the infested territory in the past few years. The methods and practices followed on the demonstration farms are fast being adopted by farmers generally, many agents reporting that 50 per cent of all farmers in their territory follow instructions almost as closely as do the regular demonstrators and cooperators.

CORN DEMONSTRATIONS.—The corn crop of the Southern States was considerably less in 1911 than in 1910, owing to the long-continued drought, which was especially severe in Texas, Oklahoma, Arkansas, and Louisiana. Notwithstanding this fact, the average yield on all demonstration farms, except in Texas and Oklahoma, was but little less than in 1910 and generally larger than in 1909 or any previous year. That the South produced as large a crop of corn as it did in 1911 was largely due to the influence of the demonstration work.

GRASS DEMONSTRATIONS.—A new and very promising line of work begun during this year is that of demonstration in grass. One hundred demonstration farms of 1 acre each were established in 20 counties in South Carolina. An average yield of 3,146 pounds of cured hay at an average cost of $23.66 per acre was produced, and in some instances as much as 5,000 or 6,000 pounds of cured hay per acre was harvested. These highly satisfactory results have stimulated great interest in grass growing, especially in South Carolina. A vigorous grass campaign has been started in North Carolina, Virginia, and other States. It is expected that 5,000 or more alfalfa demonstrations will be started this fall in Virginia alone.

WORK IN FLOODED TERRITORY.—In the overflowed section of the Mississippi Valley, conditions have been very bad. When the water receded it was often impossible to get labor and stock back on the land in time to plant crops. When planted the crops in many places have been totally destroyed by insects. The demonstration agents in this territory have endeavored to aid the people in every possible way. In connection with other offices, a bulletin on emergency conditions was prepared and distributed. Demonstration agents have been able to render much assistance in collecting and distributing seeds and plants for those who were unable to replant without such assistance. In cooperation with the director of the experiment station and the State relief committee, agents in Louisiana distributed about $30,000 worth of suitable seed, and much work of the same character has been done by our agents in the other States. Every effort is being made to encourage the planting of fall and winter crops, in order that the people of this section may be able to live and carry their stock through the coming winter.

FARM PRACTICE.—The general improvement in farm methods and practices and in rural conditions, noted in other years as among the results of demonstration work, has continued in no less marked degree during the past year. The use of better seed, more horse power, and improved implements; the increase of live stock and in the production of leguminous hay and of home supplies; and the general improvement in homes and in living conditions have all been very evident features of the year's work.

BOYS AND GIRLS' DEMONSTRATION WORK.

Corn clubs.—Although the weather conditions were unfavorable for corn, the records made by the boys in 1911 were none the less remarkable and excellent. The diplomas of the Secretary of Agriculture to winners of prize trips to Washington were still more generally sought after. In some of the States two or more boys did so well that additional trips and diplomas were awarded. Twenty boys were winners of a trip to Washington. Seven of these boys each produced over 200 bushels of corn on his acre at very low cost, and all of the yields were remarkable under the conditions that prevailed in the respective States. It is noteworthy also that hundreds of other boys in the corn clubs throughout the South did nearly as well as these winners.

The great educational value and economic importance of this work is unquestioned. The continued liberality of business men and citizens generally in giving prizes and otherwise cooperating in the work indicates an increasing and vital interest in it. The enrollment for 1912 is 12,104 greater than for the previous season.

Cotton clubs.—As planned, boys' cotton clubs were organized in the various States for the season of 1912, the heaviest enrollment being in Texas and Oklahoma. It is intended that members of these clubs shall be boys who have had one or more years' training in corn clubs. They are expected to cultivate at least 2 acres of land and to give special attention to seed selection for the purpose of increasing the quality of the staple as well as striving to secure large yields at low cost. The total enrollment of these clubs for the season was 4,690, and indications are that results will be very gratifying.

Milo and Kafir-corn clubs.—In portions of Oklahoma and western Texas, droughts are of such frequency and severity that corn is an uncertain crop. In these sections Kafir corn and milo maize are much more dependable crops and should be generally grown. It was felt that it would be impossible to stimulate interest in corn-club work among the boys of this section, because they would naturally feel that they could not compete with the boys in humid sections. By the substitution of Kafir corn or milo for corn much interest has been aroused in the club work in that section, and it is believed that these clubs will prove as useful and influential there as corn clubs elsewhere. Wherever possible the boy is encouraged to also cultivate an acre of corn under the same conditions that he cultivates his Kafir corn or milo, in order to show the contrast in yields between these crops under semiarid conditions. The season's enrollment of boys was 1,361, and it is believed that the enrollment will be much greater next year.

Girls' canning clubs.—That there was a demand and evident need for the work with girls, corresponding to the boys' corn-club work, is shown by the rapid increase in enrollment and the intense interest shown in this division of the work. The expenses of the girls' club work are paid entirely from the funds of the General Education Board, but the work itself relates directly to the problem of readjusting southern farm conditions by the raising of home supplies. This work reaches directly into the home, and it is noticeable that at the meetings held for instruction in canning the mothers are usually present and evince as much interest in the proceedings as do the club members themselves. The season's enrollment of girls was 23,550. Each cultivates one-tenth of an acre in tomatoes and other vegetables and is taught how to can and otherwise utilize the product. Many girls did excellent work and secured large returns from their one-tenth acres in 1911, and reports indicate that they will be even more successful during the coming year.

In addition to the regular club work, as above outlined, the demonstration work has aided in the formation and conduct of pig clubs, poultry clubs, and other work of similar character. Usually the boys' and girls' work is carried on in cooperation with the agricultural colleges of their respective States.

WORK AMONG NEGROES.

All demonstration agents enroll negro farmers as demonstrators and cooperators, and extend help to them the same as to white farmers. Probably from 10,000 to 15,000 negro farmers are now being directly instructed. In sections where the majority of farmers are negroes and conditions are such that it is possible to do so, agents of their own race are employed. The number of such agents has increased from 21 to 33 the past year. As a rule they are doing excellent work. The interest in better farming and living conditions aroused among negro farmers and the success attained by them in following approved methods are among the gratifying results of the demonstration work.

COOPERATION.

General Education Board.—As for a number of years past, the work during the last year in several States was supported by funds contributed by the General Education Board in cooperation with the department. These funds were expended in Florida, North Carolina, South Carolina, Virginia, Maryland, and a part of Georgia. In Texas, Oklahoma, Louisiana, Arkansas, Mississippi, Alabama, Tennessee, and south Georgia the work was supported by funds derived from congressional appropriation. The work in all the States is carried on in exactly the same way, and all agents, regardless of the source from which their salaries are derived, are selected by the department and are under its complete control.

Cooperators in general.—Increased cooperation was received from States, counties, agricultural colleges, schools, boards of trade, and private citizens generally during the past year. State appropriations were made in Alabama, South Carolina, Virginia, and Florida. Many counties contributed directly to the work in Mississippi, Arkansas, Texas, Virginia, and other States. Louisiana was added to the number of States whose legislatures have passed laws authorizing county authorities to appropriate money for the purpose of cooperating with the department in paying local agents to do demonstration work. The extent of this cooperation from all sources can be best appreciated by stating that, including the sum appropriated by the General Education Board, the grand total received was almost equal to the congressional appropriation.

In most of the States the agricultural colleges cooperate in conducting the boys and girls' demonstration work. The experiment stations of the various States and the colleges as well have given valuable assistance to the adult work. An agreement was reached whereby Clemson College cooperates with the department in all demonstration work in South Carolina. The State demonstration agent is also director of extension work of the college, and the demonstration agents in the State are all jointly employed by the college and the department. The plan is very favorably regarded and may be extended to other States.

The success and popularity of the demonstration work is shown in no way better than by the fact that its methods are being adopted by various railroad companies that undertake similar work along their lines in thorough harmony with the efforts of the department.

OTHER BUREAUS.—The demonstration work has proved a valuable agency in assisting other offices and bureaus in obtaining knowledge of field conditions and in transmitting information of value to the farmers.

In preparation for more thorough cooperation, live stock and truck-crop surveys of the Southern States have been made. It is believed that the mass of information acquired in these two surveys will be helpful in furthering the work of the department along these lines. Boys' pig clubs are being started in Alabama and Louisiana and girls' poultry clubs in Virginia in cooperation with the Bureau of Animal Industry. It is believed that the organization maintained by the demonstration work in the Southern States will be increasingly useful to the entire department.

PLANS FOR FUTURE WORK.

No important changes will be made in the general plan of work for the coming fiscal year. Efforts will be chiefly directed to intensifying and broadening the work in territory where it is already established. The congressional appropriation will be expended in territory now infested and soon to be infested by the boll weevil, including the entire State of Georgia. The grass demonstration work will be prosecuted with vigor in the States of North Carolina, South Carolina, Virginia, Tennessee, and Alabama.

In cooperation with farmers in long-staple-cotton territory the effort to breed early-maturing-staple and Sea Island cottons suited to boll-weevil conditions will be continued.

As an adjunct of the corn clubs, it is expected, with great promise of success, that boys' pig clubs will be inaugurated in a number of States.

The plans for the fiscal year 1914 must necessarily be somewhat indefinite and will depend to a great extent upon the amount of cooperation received. Constant demands are being made for the extension of the work. There are still some counties in every State where we have been unable, for lack of funds, to place local agents.

The work will be extended to such counties as fast as it is possible to do so. It is planned to effect cooperative agreements as far as possible with the agricultural colleges of the various States for the joint conduct of the work.

DRY-LAND AGRICULTURE.

The investigations of dry-land agriculture, under the direction of Mr. E. C. Chilcott, have been continued in the Great Plains region. The regular work in crop rotations and cultivation methods has been conducted at 16 stations located in eight States. Eight of these stations are in cooperation with State experiment stations and are located at their substations at Moccasin, Mont.; Williston, Dickinson, Hettinger, and Edgeley, N. Dak.; North Platte, Nebr.; and Hays and Garden City, Kans. Three are in cooperation with the Office of Western Irrigation Agriculture and are located at Huntley, Mont., Bellefourche, S. Dak., and Mitchell, Nebr. One is at Amarillo, Tex., in cooperation with the Office of Cereal Investigations. Four are operated independently by the Office of Dry-Land Agriculture and are located at Ardmore, S. Dak., Akron, Colo., Dalhart, Tex., and Tucumcari, N. Mex. The personnel of the scientific staff in charge of the work at the field stations remains as it was last year.

The results of the investigations have been valuable. The drought has been sufficiently severe at most of the stations to afford an opportunity to test the various methods of cultivation and crop rotations. Hail completely destroyed or greatly damaged the crops at three stations, but the notes taken up to the time of loss will be of value.

WESTERN IRRIGATION AGRICULTURE.

The investigations of western irrigation agriculture, under the direction of Mr. Carl S. Scofield, relating to the utilization of lands belonging to projects of the Reclamation Service and other areas in the arid and semiarid West, have been continued. Field studies of problems pertaining to some of the newer agricultural areas of the West are included, and experiment field stations are operated on certain of these areas. At these stations facilities are provided for cooperative field and laboratory work in the solution of various plant-industry problems by the specialists of the bureau or by investigators employed by State experiment stations. The investigational work has to do with crop acclimatization, plant breeding, variety testing, methods of tillage, crop rotation, plant diseases, and the testing of plants newly introduced from foreign countries. The results of these investigations are made available to the farmers of the regions through publications and by local demonstrations. The irrigation experiments at Huntley, Mont., Bellefourche, S. Dak., and Scottsbluff, Nebr., are closely related to each other.

FIELD STATIONS.

The San Antonio field station is located 5 miles south of San Antonio, Tex., on 125 acres of land belonging to the city and leased to the department without cost for a period of 10 years, ending June 30, 1914. The lines of work include (1) testing new plant introductions and such indigenous fruit and nut plants as are thought to be suitable for stocks for cultivated varieties and for use in breeding improved varieties; (2) methods of tillage best suited to the production of the more important annual crops, such as cotton, corn, and sorghum; and (3) rotation experiments with the annual crops.

The Yuma field station is located on 160 acres of public land which has been reserved for this purpose adjacent to the town of Bard, Cal., about 7 miles north of Yuma, Ariz. The lines of work include (1) breeding and acclimatizing Egyptian cotton; (2) testing new plant introductions, including figs and dates; (3) methods of tillage of the more important field crops, such as cotton, alfalfa, and corn; and (4) testing new fiber crops, such as hemp and ramie.

The Truckee-Carson field station, located 1 mile south of the town of Fallon, Nev., occupies 160 acres of public land reserved for this purpose. The lines of work include (1) testing various field and garden crops, to determine which are best suited to the climate and soils of the region; (2) tillage and laboratory experiments, to ascertain the best methods of bringing into productiveness some of the more refractory desert soils; (3) cooperative demonstrations with farmers; and (4) testing varieties, fertilizers, tillage methods, and orchard pruning and spraying.

The Umatilla field station, located 2 miles west of the town of Hermiston, Oreg., occupies 40 acres of public land reserved for this purpose. The work at this station is in cooperation with the Oregon Agricultural Experiment Station, and the responsibility for the supervision of the experiments is carried by that institution. These experiments deal chiefly with orchard and truck crops, including tests of varieties, methods of planting, tillage, and fertilization.

The Huntley field station adjoins the town of Osborn, Mont. The station proper includes two tracts of public land of 160 acres each. These lands are cut by two railroads and two wagon roads, and much of the remaining land lies above the ditch, so that less than 100 acres are available for irrigation experiments. The experimental work includes (1) methods of tillage for a number of important crop plants, such as sugar beets, small grains, and hay crops, with particular attention to methods of seeding alfalfa; (2) rotation experiments under irrigation, occupying 28 acres of land in one-fourth-acre plats; (3) testing numerous varieties of orchard fruits, such as apples, plums, and cherries; and (4) rotation and tillage experiments in dry-land agriculture on 20 acres of land above the ditch. An experiment is being conducted on a tract of 40 acres of alkali land near the town of Worden on the same project, the aim of which is to determine the best method of bringing this land into a condition of productivity. The experimental work of this field station has been planned in cooperation with the officers of the Montana Agricultural Experiment Station, and that institution gives some financial support to the work.

The Bellefourche field station, located 1½ miles west of Newell, S. Dak., includes 280 acres of public land, of which about 150 acres are irrigable. The larger portion of the experimental work at this station is conducted in cooperation with other offices of the bureau. The Forest Service also cooperates in some tree-planting demonstrations. The chief lines of work are breeding cereals, breeding and physiological experiments with drought-resistant forage crops, methods of tillage and rotation experiments on dry land, and rotation experiments under irrigation.

The Scottsbluff field station, located 6 miles east of Mitchell, Nebr., includes 160 acres of public land, all irrigable. The Nebraska Agricultural Experiment Station is cooperating in the maintenance and conduct of this station. The lines of work include the testing of varieties of field crops, experiments in methods of tillage, rotation and tillage experiments on dry land, the investigation of certain diseases of potatoes, and rotation experiments under irrigation.

OTHER LINES OF WORK.

In addition to the operation of the field stations listed above, cooperative work is carried on (1) with an association of farmers, whose aim is to determine the methods of tillage and rotations best suited to the production of potatoes, barley, onions, and beans on the so-called tule lands near Stockton, Cal.; (2) with the North Dakota Agricultural Experiment Station, at Williston, to supervise the irrigation work and to aid farmers in working out their individual irrigation problems.

The results of the experiments in acclimatizing and breeding Egyptian cotton at Yuma, Ariz., indicate that this crop might be established profitably in certain of the irrigated sections of southwestern Arizona and southeastern California. Consequently it has seemed advisable to arrange for a thorough cooperative test of the crop on a commercial scale by farmers in the Salt River Valley in Arizona, the Colorado River Valley, and the Imperial Valley in California. This work is now in progress, and 800 acres of land have been planted. This acreage is divided among a large number of farmers, most of whom have planted from 1 to 10 acres each.

PLANS FOR FUTURE WORK.

It is proposed to continue the work along the lines indicated, except that the work at Williston, N. Dak., is to be discontinued. Provision is to be made for increasing slightly the work at several of the field stations and for a material increase of the work of establishing Egyptian cotton production in the irrigated regions of the Southwest.

POMOLOGICAL COLLECTIONS.

The work in connection with the pomological collections has been continued under the direction of Col. G. B. Brackett.

Investigations along three main lines of work—fruit culture, fruit nomenclature, and fruit identification—show for the year most satisfactory and gratifying results.

FRUIT CULTURE.—The work on small fruits is making satisfactory progress. About 250 varieties of strawberries, raspberries, currants, and gooseberries have been recently planted on Arlington farm in order to make an exhaustive study of varieties and methods of culture, which will be supplemented by a study of varieties and cultural methods in the leading centers of the industry in the Eastern States. Blight-proof pear trees and choice varieties of hickory nuts are also being tested. An illustrated bulletin on the Persian walnut has been completed and is now in press. Investigations covering the improvements of the more hardy varieties of this nut by selection and cross-fertilization are in progress at Arlington farm. Methods of propagation by budding and grafting and the stocks suitable for propagation in the several districts in which this nut appears to be hardly will also receive consideration.

Fruit nomenclature.—Data on peach nomenclature has been partly tabulated for publication. The card-index files covering citations as to the nomenclature of the various fruits have been increased by about 2,000, as follows: Apples, 564; pears, 76; peaches, 250; plums, 480; small fruits, apricots, and nectarines, about 740. Notable accessions have been made to the biographical index, the index of historical data, and indexes covering various minor phases of the work. In the prosecution of this work some 52,000 pages of books, magazines, and newspapers have been consulted.

Fruit identification.—The increase of the work of identifying fruits attests the renewal of interest in fruit growing throughout the country and the desire of growers to know what they are growing. A key for use in the identification of apples has been worked out which is of material assistance with varieties not well known. The collections of fruit at State and national exhibitions have been studied and compared, and 524 hand paintings of fruits have been made as aids in the identification work. Receipts for the year number 5,955; descriptions, 239.

Plans for future work.—The lines of work now pursued will be continued without essential modifications other than those incidental to the progress made.

FIELD INVESTIGATIONS IN POMOLOGY.

Investigations in the field relating to the culture and handling of fruits have been continued under the direction of Mr. A. V. Stubenrauch.

Fruit marketing, transportation, and storage.—Investigations having for their principal object the determination of the relationship between the type of handling given fruits in preparing them for shipment and the occurrence of decay and deterioration continue to yield results of great importance to the various fruit industries under observation. The work during the past year has dealt principally with oranges and pomelos in Florida; table grapes, lemons, apples, loganberries, and blackberries in California; and raspberries in Oregon.

Along with the studies of handling methods the investigation of precooling these various fruits in advance of shipment has been continued. The general principles underlying the handling of fruits which were first determined in the early department work with apples and oranges have been found to apply to all classes of fruits, without exception. The type of handling given a perishable fruit, such as the red raspberry, has as definite a relationship to its behavior while in transit and after arrival in market as exists in the case of the less perishable fruits, such as apples, oranges, and lemons. It has been shown that precooling can not be depended upon to overcome decay and deterioration due to improper or rough handling, a point which is of especial importance to the growers and shippers of deciduous fruits, including grapes and berries.

The handling and shipping work with Florida citrus fruits has been discontinued, after having been in progress during six successive seasons. The work of the last season was devoted mainly to a demonstration of the effectiveness of careful handling methods in the preparation of Florida citrus fruits for market. This work was conducted on as large a scale as possible, in order to apply the results of the department investigations to actual practice. The Florida citrus industry has been completely changed as a result of the department work, and a tremendous saving to the citrus growers has been accomplished, not only in the quantity of fruit actually saved, but in the reputation of Florida citrus fruits as related to the possibility of extending the markets for them.

Much attention has been given during the past six years to the feasibility of holding California table grapes in cold storage, in order to avoid serious gluts and to replace the imported Spanish fresh grapes with the American product. This work has shown the necessity of using a filling material in packing the grapes intended for long holding. The Spanish grapes are packed in ground cork, but on account of the impracticability of obtaining the cork in sufficient quantities and at a low price an investigation of different substitutes has been made, with the result that California redwood sawdust has been found to be admirably adapted to this purpose. The grapes packed with this material keep longer and in better condition than in the ground cork.

The table-grape storage work has received commercial recognition in California. During the past season several carloads of grapes, after being packed in redwood sawdust under the supervision of department investigators, were held in cold storage in New York City and Chicago for the holiday trade. They found ready sale on the markets at prices well in advance of fruit packed in ordinary open crates. The interest of grape growers and shippers has been aroused to the extent that plans have been made to pack about 100 carloads of grapes for storage during the coming season.

Among the lines of work planned for the next fiscal year the extension of the grape-storage work on a commercial scale is contemplated, together with further investigations of the handling and precooling of peaches from Georgia and from the Northwest, raspberries, loganberries, and strawberries.

The continuation and extension of the investigation of the behavior in storage of apples from the Northwest is also a line to which special attention will be given. A study of the picking, packing, storing, and possible exporting of Florida grapefruit will replace the orange handling and shipping work in that State during the coming year.

During the fiscal year 1914 an extension and continuation of all the fruit-handling, precooling, and storage lines is contemplated. Many calls are being received from different fruit-producing sections of the country for investigations and demonstrations along these lines, and it is urgent that a sufficient staff of workers and suitable equipment be provided to enable the work to go on simultaneously in several different regions. The investigation of the exporting of American fruits to foreign countries, with special reference to the apple, is a line of work which demands attention, and it is hoped that provision will be made for this investigation during the next fiscal year.

Fruit-district investigations.—The study of the adaptability of different varieties of fruits has been continued. Field work in the territory which includes central Oklahoma, central and eastern Kansas, and southeastern Nebraska was completed during the season of 1911. The compilation of a 10-year series of phenological data, collected through the aid of a very large number of voluntary observers in different parts of the country, is actively under way and yields valuable results.

During the coming fiscal year it is proposed to extend these investigations to include the region of Tennessee, Kentucky, West Virginia, and restricted contiguous areas in several adjacent States. The various fruit-producing districts of the country will be studied as rapidly as time and means will permit, with the eventual object of providing a complete manual of the adaptability of different varieties in the several regions of the United States.

Among the new lines in contemplation for this work is the measurement and determination of the physical factors of environment, by means of which it is hoped to establish the actual figures bearing on varietal adaptability. It is planned to include in this work a broader study of actual fruit production in various parts of the country. Special attention is to be given to the commercial production of subtropical fruits, including mangos, avocados, citrus fruits, figs, and oriental persimmons.

Viticultural investigations.—The investigations pertaining to viticulture have been organized under three principal groups, based on the types of grapes grown, including the Vinifera, or European, and the American native grapes of the Labrusca and Muscadine types. The principal regions adapted to the culture of the Vinifera varieties are on the Pacific coast. Varieties of the Labrusca type are grown principally in the Eastern and Middle Western States, and the Muscadine varieties in the South Atlantic and Gulf States. The work in viticulture has been begun in these three regions, special experimental plats having been established in California, New Jersey, North Carolina, and Florida.

In the Vinifera group the study of the congeniality of different varieties to different resistant stocks is yielding valuable results, especially in determining the influence of various stocks upon the yield of fruit, as well as upon the quality of the grapes for different purposes. The bearing qualities of the Panariti grape, one of the varieties of seedless grapes from which the so-called "currants" of commerce are made, are strongly influenced by grafting upon certain stocks. When grafted upon the proper stock this variety produces successfully in California, and thus the possibility of producing the commercial currant on a large scale in that State is being demonstrated.

Special attention will be given during the coming year to a large-scale demonstration of the practicability of producing the currant grape in commercial quantities. Arrangements are also being made for a commercial demonstration of the practicability of growing the Almeria and Malaga varieties, which thus far have not been successfully produced in commercial quantities in America.

In the investigations in the Muscadine grape regions of the South Atlantic and Gulf States close studies are being made of the handling of the vineyards, including pruning, training, fertilizing, and propagating. Special attention is being given to the pollination of the Muscadine grapes. While the vines are botanically monœcious, two varieties have been found which are diœcious and therefore self-pollinating. This advance in Muscadine grape work indicates the possibility of establishing vineyards of self-pollinating vines and thus greatly facilitating the improvement of the native varieties by selection.

Fruit improvement.—The investigation of the improvement of citrus fruits through bud selection has been in progress during three full seasons. The data obtained from careful observations on the bearing of Washington Navel oranges and Marsh grapefruit, or pomelos, continue to show very marked differences in the yields of individual trees of the same age growing under the same conditions. The large-yielding trees have produced maximum crops during the three seasons, while the small bearers have consistently proved to be shy in bearing properties throughout. This work was extended to the lemon during the past year, and consistent results with this fruit are also being obtained. Close studies on the character of variations in citrus fruits are being made.

This work has received wide recognition from citrus growers, and the department investigation is serving as a basis for the selection of propagating material, both in the establishment of new plantations and in rebudding operations. Citrus growers have followed the department work very closely, and many have made individual tree studies; one large company, operating more than a thousand acres, now determines the production of each tree in its groves.

These investigations are being gradually extended to deciduous fruits, two seasons' observations having been made on peaches in Connecticut. Field studies of apples are in progress, and it is hoped that systematic work along these lines with apples and other deciduous fruits can be carried on during the coming fiscal year.

Nut culture.—The work of acquiring information regarding the adaptability of the principal species of nut trees grown in the States east of the Rocky Mountains to special localities, the comparative behavior of varieties, the details of orchard operations, and the study of the nuts themselves, along the lines which have been in progress during the preceding years, has been continued during the fiscal year just closed.

The principal new work inaugurated during the year was that of obtaining exact bearing records of pecan orchards. Promises of orchard yields proportionate to the returns from occasional single trees have induced many persons to make investments in pecan growings during the past five years. The records already acquired have established the fact that trees of the same age, variety, and apparent environment may vary greatly for any single tree; hence, the danger to capital invested on the strength of such computations is beyond question. The obtaining of records from entire orchards is therefore of very great importance to all prospective planters.

Plans for future work.—It is planned to continue all lines of investigations now under way and to take up such new problems as may be possible, special attention being devoted to the procuring of data on orchards and individual trees, in order to bring about a greater degree of uniformity within established varieties.

EXPERIMENTAL GARDENS AND GROUNDS.

The work of caring for the greenhouses and grounds of the department has been continued in charge of Mr. E. M. Byrnes.

Greenhouse operations.—Such repairs were made to the older range of greenhouses as was necessary to keep them in first-class condition.

The 27 greenhouses are devoted to the following work: The propagation of trees, plants, and fruits collected by the Office of Foreign Seed and Plant Introduction; general hybridization work; seed testing; experimental work with collections of citrus and other tropical fruits; propagation of plants for ornamenting the grounds of the department and those of the Weather Bureau, for miscellaneous experimental work, and for special congressional distribution; experimental work with vegetables; experimental work with florists' crops, including 2,716 roses (9 varieties), 4,895 carnations (6 varieties), 1,805 hybrid seedling plants, 3,163 chrysanthemums (180 varieties); and plant breeding work.

The chrysanthemums were grown for our annual exhibition, the interest in which increases year by year. At the close of each show the flowers are cut and distributed to the hospitals in the city.

Propagation and distribution.—During the year 56,000 plants (47 species and varieties) were propagated and distributed. In addition, 95,000 strawberry plants and 27,850 grape vines were packed and forwarded from our packing room.

General improvements and caretaking.—A structure of concrete for storing ice was built in the terrace slope at the west end of Laboratory B; 126 square yards of concrete walks and 98 square yards of concrete roads were laid in the grounds; 132½ square yards of concrete floor were laid in the boiler house; asphalt roads were repaired and the macadam roads resurfaced; lawns were treated with stable manure and commercial fertilizer; the lawns were mowed and their edges trimmed, replantings were made, and such other work was done on the grounds as was required to maintain them in good condition.

Ornamental plantings.—Collections of 15,600 standard sorts of hyacinth, tulip, and narcissus bulbs and 6,800 pansy plants were planted in the beds in the autumn for display in the early spring. Collections of 15,700 bedding plants (29 species and varieties) and 1,072 tropical plants (34 species and varieties) were planted in beds in the spring.

Plans for future work.—It is proposed (1) to construct a greenhouse in the northeast corner of the grounds for use in drug-plant investigations; (2) to remove two small greenhouses used for experimental work with vegetables and rebuild them as one house for experimental work with alfalfa; (3) to give a coat of paint to six greenhouses and to the iron picket fence on the north front of the grounds; and (4) to remove the worn-out asphalt and other walks from the north front of Laboratory B, fill in with topsoil, grade, and seed to grass.

The work of hybridization, experimental work with florists' crops, together with the propagation of trees, plants, and shrubs, and the general care of the grounds will be continued along the same lines as heretofore.

HORTICULTURAL INVESTIGATIONS AND ARLINGTON FARM.

The general maintenance and development of the Arlington Farm, as well as the investigations with truck crops, in landscape gardening, floriculture, etc., have been continued under the direction of Prof. L. C. Corbett. Marked progress has been made in all the important projects.

ARLINGTON FARM.

Under the immediate supervision of Mr. E. C. Butterfield, there has been a decided increase in the demand for land and facilities for work at the Arlington Farm by the various offices of the department during the past year, and although it has been thus far possible to furnish such facilities, all of the available area, greenhouse space, and equipment for such work have now been assigned. Field investigations at the farm during the year have been conducted by the Bureau of Entomology, the Bureau of Soils, the Forest Service, and also by numerous offices of the Bureau of Plant Industry.

General improvements.—The extent of ground for experimental use at the farm has been increased by installing a 42-inch concrete conduit, which takes the place of one of the large open ditches. A complete survey of the farm, embodying plans for the drainage of areas not already tiled, has been made. Arrangements have been perfected for the installation of apparatus to permit the use of the electric current for lighting purposes in addition to power. The equipment has been enhanced by the purchase of horses, farm wagons, power spray pump, stone crusher, concrete mixer, collapsible steel concrete forms, fire extinguishers, watchman's clock, and needed agricultural implements.

Soil improvement.—The improvement of the soil is indicated by the annual increase in the variety and yield of the crops grown. This gratifying result has been attained by the use of soil-improving mixtures supplemented by a winter cover crop of rye and hairy vetch. During the year 2,195 loads of manure were hauled from Fort Myer to the farm.

Lawns, nursery, and greenhouses.—A collection of plants for the cooperative work with the Forest Service at the ranger stations was sent out and arrangements have been perfected for an additional supply of material for next season's distribution. Two greenhouse units are devoted to general propagation purposes, three to the selection and breeding of carnations, two to roses, four to lettuce, four to cauliflower, two to tomatoes, two to nutrition and pathological tests, and one to tests of forest-tree seeds.

Farm needs.—The greatest need of the farm is a suitable laboratory building with equipment for meeting the requirements of the scientific work now centered in field researches. The congested condition of the present buildings and the inadequate facilities afforded the investigators greatly handicap their work. Additional land will be necessary for the increase of field work. The handling of supplies and equipment could be greatly facilitated and the efficiency of the work enhanced by the use of a small-sized motor truck.

TRUCK-CROP INVESTIGATIONS.

Potato investigations.—Research work relating to Irish potatoes has been continued by Prof. William Stuart and Mr. W. V. Shear. The problems covered include (1) the development of new varieties or strains of potatoes through breeding and selection; (2) testing named European and American varieties to determine their disease resistance and other characteristics; (3) cooperative disease-resistant work with the Vermont Agricultural Experiment Station; (4) cooperative dry-land and irrigation investigations; (5) the study of factors influencing the development of tubers upon the potato plant; (6) tests to determine the value of seed potatoes of the same parentage when grown in various localities for use in the trucking region; and (7) comparison of germinated and ungerminated potatoes for seed in the trucking region.

The study of the 20,000 seedlings of known parentage grown in one of the important potato-growing sections of central western New York from seed produced in 1909 showed a considerable number that are very promising, not only as to general habits of growth and development of tubers, but as to ability to withstand trying conditions. In order to determine more fully their relative merits from a commercial as well as disease-resistant standpoint, 10,000 of these seedlings were again planted at Honeoye Falls, N. Y., and Houlton, Me. The collection of seedlings grown from the seed crop of 1910 numbers 7,000. Preliminary tests indicate that it is possible to hold over first-crop southern-grown potatoes until the following spring without visible deterioration of vitality and clearly demonstrate the great variation which exists in the potato. Varieties in the Arlington collection, planted on the tuber-unit basis, showed marked variation in behavior during the growing season and at digging time. The selection of healthy productive hills by the tuber-unit method is the most effective means yet found for securing a uniform stand and large yields.

The collection of named varieties under test was supplemented by the introductions of the trade during 1911 and by additional new material, including 22 varieties from Galicia, Austria, selected for their high starch content. The low starch content of American varieties has been the subject of considerable comment and the object of importing higher starch-producing strains from Austria was to determine whether these varieties, when grown in America, would continue to produce tubers with high starch content.

The absence of both early and late blight at Middlebury, Vt., has caused the transfer of the cooperative work in disease resistance from that point to Houlton, Me., in the hope that the new locality may prove more favorable as to results.

Cooperative investigations to determine methods of planting and cultivation best suited to the respective localities were conducted during 1911 at nine dry-land stations in the States of Nebraska, South Dakota, North Dakota, Montana, Colorado, Utah, Texas, Oregon, and Kansas. A uniform outline for all stations was formulated, and the work is being repeated this year at all the stations, with considerable extensions in Nebraska.

Preliminary experiments in the study of tuber formation of potatoes indicate that deep planting has little influence on the number of tubers, but has considerable influence on their development. The most important effect of deep planting is apparent in the lengthening of the internodes of the plant below the surface of the soil.

The test to determine the region from which seed for best results in the trucking region can be obtained has been continued. The work of the year confirms the idea that seed from the North and from high altitudes of the Southern States is more productive and earlier than seed grown in the local trucking region.

Tests to determine the comparative value of germinated and ungerminated potatoes for seed made during one season only with northern-grown seed were negative in their results.

The present commercial potato industry in the trucking region is based entirely on varieties not especially developed for the industry or the locality. The potato industry in the irrigated section of the country has been developed in exactly the same way. In order to make these industries what they are capable of being made, sorts especially suited to the system of cultivation and the particular climatic conditions of the region should be developed. In order that the greatest value may come from this collection, it should not only be tested at the three points now under observation, but the test should be extended to Florida, to some point in Louisiana or Texas, and to California.

Sweet-potato investigations.—The growing, storage, and desiccation work on sweet potatoes has been continued. Feeding tests are being conducted in cooperation with the Bureau of Animal Industry with desiccated products, and the manuscript for a bulletin on storage of the crop has been prepared. The cooperative studies on the physiological behavior of sweet potatoes in storage has been continued. Arrangements are being made with the experiment stations of Alabama and Mississippi to conduct cooperative storage tests. The problem of properly housing and storing this crop is of great economic importance in the South. It is planned to extend activities in connection with this industry, so as to determine the best methods of storing, shipping, and marketing.

Celery investigations.—Attempts to place large quantities of celery in cold storage in various parts of the country have developed conditions which make it necessary to carefully investigate not only the field handling of celery, in order to produce a clean, disease-free crop, but to determine the best type of crate and the method of packing, transporting, and storing the crop, in order to meet the market requirements. The success of the storage industry with celery is dependent upon the solution of these problems.

Onion investigations.—The Denia onion industry has progressed far enough to demonstrate the possibility of a satisfactory American production of this type of onion. The one drawback to the Denia and Bermuda onion industries is the question of seed supply. At present Denia seed comes from Spain and the Bermuda from the Teneriffe Islands. The unreliability of the supply places the American industries on a very hazardous basis. Some preliminary work has been done to determine the possibility of growing these types of onion seed in America.

Peanut investigations.—The rapid extension of the peanut industry through the boll-weevil district has precipitated a great demand for information concerning the methods of cultivating, harvesting, and utilizing the crop. It is estimated that the increased acreage in Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, and Texas was more than that of any previous year, and that the increase in Mississippi alone was at least 50,000 acres. In addition to the demonstration work in connection with this crop experiments are under way to determine the best methods of improving the peanut crop so as to secure a maximum yield of high-grade nuts. A large number of selections have been made and are now being grown in Mississippi and Alabama. Cooperative arrangements have also been made with the Mississippi Agricultural Experiment Station for conducting feeding tests with peanuts to determine their value for feeding hogs. While the peanut is of great economic importance as a stock food throughout the whole region to which it is adapted, it is also a valuable cash crop. The peanuts have a commercial value for use in the manufacture of important food products, such as peanut butter, peanut oil, and various forms of confections. Peanut butter is rapidly assuming importance among food products, and a few of the oil mills which have heretofore given their attention exclusively to the expression of oil from cotton seed are now installing equipment for expressing peanut oil. The high food value of peanut oil and the fact that it is adapted for cooking and for all classes of table use to which olive oil can be put, makes apparent the importance of producing it in commercial quantities. It has been demonstrated that the Spanish peanut, which often carries as much as 42 to 44 per cent of oil, can be successfully used for making oil.

The importance of the industry and the fact that there are many technical problems connected with the manufacture of the oil and the peanut butter which are not thoroughly worked out make it necessary that the industry still continue to receive most careful attention.

Testing gardens.—The trial of vegetables in connection with the purchase and distribution of the congressional seed involved the testing of over 2,000 samples of vegetable and flower seed. These tests resulted in the rejection of many lots offered, as they were found to be impure and of inferior varietal character; but they clearly showed that the seeds used in the distribution are the equal of those sold by the leading seedsmen of the country. In addition to the test of samples offered in the distribution, novelties of the trade were tested to determine the varietal characteristics of new sorts.

Standardizing vegetables.—The standardizing of strains of vegetables has been continued along the same lines as last year. Two greenhouse units were devoted to the production of cauliflower seed for the purpose of determining the quantity of seed which can be produced in a given area. Results are very gratifying. Work with lettuce will be continued, considerable quantities of seed now being on hand for further trial. The selection of tomatoes, which has been in progress for the past three years, has been continued with gratifying results. Spinach-breeding work has progressed satisfactorily. A quantity of seed from perfect-flowering plants has been secured, by which it is hoped to eliminate the staminate plant. Beet-seed work is progressing slowly but satisfactorily. Several promising strains are under test.

First-generation hybrids.—A test to determine the value of first-generation hybrids as a source of fruit production was inaugurated with tomatoes. A number of standard sorts were crossed, and the progeny of these plants is being grown.

Bean-breeding experiments.—For two years selections of beans have been made for line breeding, in order to develop strains of field beans which shall be more productive, better adapted to special conditions, and at the same time free from anthracnose. Some 2,000 individual plants were grown as the result of this selection last year, and their yield has been carefully measured to determine relative values. Work this season is based on the selections thus obtained. Several years will be required to complete this investigation, but it is believed that the results will justify the expense of its continuation.

Muskmelons.—Place-effect studies with muskmelons, in cooperation with the Bureau of Chemistry, were continued during the year at points in Florida, Tennessee, Colorado, Indiana, and Connecticut. The second year's results corroborated to a marked degree the results obtained in the first year's trial. The work is being continued and so broadened as to determine, if possible, the particular time at which the flavor and sugar content of the melons develop.

Sweet corn.—The breeding and development of sweet corn in order to secure special strains of superior value for table use and for canning is still under way. The place-effect trials in cooperation with the Bureau of Chemistry have been completed. The report from a horticultural standpoint will be forthcoming.

Needs of the breeding work.—Additional facilities are needed to enable more extended work to be conducted in breeding sweet corn, tomatoes, and peas—crops which are of great economic importance in connection with the canning industry. The difficulties which have arisen in connection with the growing of satisfactory sweet corn for canning purposes make it imperative that the department give attention to this crop. The force of trained specialists to carry on this work has been too small to enable the department to undertake the important problems connected with the cultivation and handling of peas for canning.

Truck-crop survey.—Work upon the truck-crop survey has been continued during the year, as a side line to all of the field investigations. In addition, a cooperative arrangement was effected whereby a very complete report of the trucking localities and trucking conditions existing in the cotton-producing States was procured.

Marketing truck crops.—The study of cooperative marketing methods practiced by many of the truck growing and marketing associations in connection with the truck-crop survey has proved very helpful. It has resulted in the organization of successful growing and marketing organizations, which have materially assisted in widening the market for perishable truck crops. The growers themselves, instead of the city dealers, have thereby become the distributors.

LANDSCAPE GARDENING, FLORICULTURE, AND SCHOOL-GARDEN WORK.

Landscape gardening.—Much attention has been given to problems connected with landscape gardening. The work under way consists of the development of ornamental plantings at the Arlington Farm and the maintenance of nurseries for the propagation of ornamental trees, shrubs, and herbaceous plants. A portion of the plants propagated are used in the cooperative work with the Forest Service in connection with the study of the adaptation of various species to intermountain conditions. A study of street tree planting in Washington and other cities is being prosecuted.

It is proposed to extend the plantations at the Arlington Farm to include all hardy ornamental shrubs and herbaceous perennials which can be grown in this climate and as rapidly as possible to prepare bulletins descriptive of herbaceous perennials, deciduous shrubs, broad-leaved evergreen shrubs, coniferous evergreens, ornamental trees, street and roadside trees, bulbs, house plants, roses, ornamental vines, plants for special-purpose planting, planting of the farmstead, planting of city yards, and the care of trees and shrubs. If the work is to be extended it will be necessary to increase the trained office force.

Floriculture.—Floricultural investigations have been confined (1) to varietal tests of peonies; (2) to the hybridization of carnations to test the value of the first-generation hybrids and to determine the influence of two parents in transmitting color values; and (3) to the continuation of the investigations to determine the value of cuttings from blind and flowering wood as a means of propagating roses and to determine their value as stock plants for propagation.

Owing to the fact that this work has been carried on as a side line to other investigations, it has not received the attention that its importance warrants. It is hoped that funds may be made available for continuing and enlarging the work. No line of work that can be undertaken would be of greater direct benefit to those engaged in forcing flowers and vegetables than careful efficiency tests of the heating plants and of the fuel used. As soon as funds are made available, a competent engineer and horticulturist is to give attention to these problems.

School-garden work.—The usual plan of distributing collections of flower and vegetable seeds at the request of schools maintaining gardens has been continued. Requests for these seeds have been received from every State, and many Members of Congress have used a considerable proportion of their allotments of seeds for school-garden purposes. The results indicate that an increased quantity of seeds will be needed in the future.

CONGRESSIONAL SEED DISTRIBUTION.

During the fiscal year 1912, on congressional and miscellaneous requests, 10,158,358 packages of vegetable seed and 2,158,608 packages of flower seed, a total of 12,316,966 packages, each containing 5 packets of different varieties, were distributed; 13,478 one-peck packages of improved varieties of cotton seed; 5,240 packages of improved tobacco seed; 17,213 packages of lawn grass and Bermuda grass seed; 2,846 pounds of sugar-beet seed; 12,048 boxes of imported narcissus and tulip bulbs; 25,000 grapevines, including 27 varieties; 91,500 strawberry plants, including 15 varieties; 2,874 hybrid citrange trees; and limited quantities of alfalfa, clover, vetch, cowpeas, soy beans, and sorghum. All of this seed was purchased on competitive bids; approximately 30 per cent of it was from surplus stocks, the remainder being grown under contract for the department. Before acceptance by the department each lot of seed was thoroughly tested one or more times for viability, seed grown under contract was inspected in the field, and a sample of each lot of seed was grown on the trial grounds of the department to determine its trueness to type. Hundreds of reports from all sections of the country indicate that the seed was of high quality and very satisfactory.

As in former years, the vegetable and flower seed was packeted, assembled, and mailed by a contractor, the price this year being \$1.09½ per 1,000 packets, which included hauling to the city post office or direct to the mail cars at the Union Station. The contract for 1912 was awarded to a company that used a new form of automatic seed-packeting machine, which, after being adjusted, did the work very satisfactorily. The distribution of vegetable and flower seeds began November 29, 1911, and ended April 19, 1912.

Improved varieties of sugar-beet seed were tested in comparison with American-grown seed at cooperative stations in the beet-growing sections. Very little seed was grown in the United States during the crop season of 1911, but the partial failure of the seed crop in Europe, the great advance in prices, and the difficulty experienced by the sugar factories in obtaining a sufficient quantity of seed will undoubtedly encourage the growing of this important seed crop in this country.

The work of propagating Dutch bulbs at the garden near Bellingham, Wash., made satisfactory progress during the past year. From five to eight years are required for the hyacinth bulbs to mature. When they reach flowering size and complete data are available regarding their cultivation and treatment the department will feel justified in issuing a formal bulletin on the growing of these bulbs in this country. Tulip and narcissus bulbs mature much sooner than hyacinths. Some of the mature bulbs of these varieties which were propagated at Bellingham and in Virginia were tested on the trial grounds of the department in comparison with bulbs imported from Holland. In every instance the American-grown bulbs gave stronger plants, larger and better flowers, and were a week to 10 days earlier than imported bulbs of the same varieties. If similar results continue, it is believed that as soon as the facts are known the demand for American-grown bulbs will increase greatly, and the bulbs will command a higher price and a readier sale than the cheap grades of foreign-grown bulbs which are imported in large quantities annually.

It is planned to continue the congressional distribution of seeds and plants in 1913 and 1914 along the same general lines as formerly, except that an attempt will be made to obtain pure seed stocks of selected strains of standard or improved varieties to be propagated and grown under contract for the distribution. A change is also contemplated in the manner of distributing cotton seed. Instead of sending out packages of 1 peck each (which is wasteful, because the quantity is not enough to plant a sufficient area to grow a bale) the seed will be distributed in packages of 1 quart each, which is enough to enable a grower to decide whether he desires to plant a larger area the following year. If the grower is pleased with the variety and will report results to the department, a larger quantity will be sent to him the following spring. An effort will also be made to confine the distribution of cotton seed to one variety in a single community, in order to encourage the cultivation of a single type on a community basis.

REPORT OF THE FORESTER.

United States Department of Agriculture,
Forest Service,
Washington, D. C., November 11, 1912.

Sir: I have the honor to transmit herewith a report of the work of the Forest Service for the fiscal year ended June 30. 1912, together with an outline of the plans for the work of the service for the current fiscal year and the fiscal year 1914.

Respectfully,

Henry S. Graves, *Forester.*

Hon. James Wilson,
Secretary of Agriculture.

CLASSIFICATION OF EXPENDITURES.

The appropriation act for the Department of Agriculture for the fiscal year 1912 made available for the Forest Service the following sums:

For statutory salaries		$2,318,680.00
For general expenses		2,714,420.00
For improvement of the national forests		500,000.00
Total appropriation for Forest Service under the agricultural appropriation act		5,533,100.00
Emergency fire-fighting fund appropriated for expenditure by the Secretary of Agriculture		1,000,000.00
Available from other sources:		
Federal cooperation (expenditures reimbursed by other Federal bureaus)	$569.52	
State and private cooperation ($3,307.40 contributed by cooperators in 1912; $3,977.71 brought forward from 1911; less $93.32 returned to cooperators)	7,191.79	
		7,761.31
Total from all sources		6,540,861.31
At the close of the year there were unexpended balances as follows:		
From appropriation salaries and general expenses	$56,061.98	
From appropriation improvement of the national forests	841.45	
From appropriation emergency fund	949,412.86	
From unexpended cooperative funds (carried to fiscal year 1913)	4,325.46	
		1,010,641.75
Amount expended		5,530,219.56

This total expenditure of $5,530,219.56 paid the cost of administering, protecting, and improving the national forests and also of promoting the practice of forestry generally throughout the United States. The latter was accomplished through field and laboratory investigations, cooperation with States and private owners, and through activities for the diffusion of the knowledge reaped by investigations. Prorating among the several lines of work such general expenses as are incurred on behalf of the work of the Forest Service as a whole, and grouping the cost of these various lines according to the objects sought, the total expenditure may be subdivided as follows:

Administration and protection of the national forests	$4, 718, 668. 96
Permanent improvements, national forests	499, 158. 55
Cooperative and investigative work and making known results	312, 392. 05
	5, 530, 219. 56

There were also made under the direction of the Forest Service from other appropriations the following miscellaneous expenditures:

Examination of lands, titles, etc., under the Weeks law	$113, 126. 79
National Bison Range, Mont	104. 98
Refunds to depositors, excess deposits (34 Stat., 1270)	47, 716. 54
Payments to States, 25 per cent of receipts from national forest resources for the fiscal year 1911	482, 376. 18
Cooperative fire protection under the Weeks law	44, 933. 53
Burial expenses men killed in fire fighting 1910	10, 972. 65
Reimbursement for horses, etc., lost fighting fire on national forests	2, 667. 90
Reimbursement to temporary employees for time lost on account of injuries sustained in fighting fire on national forests	5, 053. 67
Cooperative funds returned to contributors	93. 32
Total	707, 045. 56

The following statement shows the amounts paid to States to be expended for roads and schools from the national forest receipts of the fiscal year 1911 and the amounts that will be paid for the fiscal year 1912:

State.	Amounts paid fiscal year 1911.	Amounts payable fiscal year 1912.	State.	Amounts paid fiscal year 1911.	Amounts payable fiscal year 1912.
Arizona	$55,385.62	$61,614.42	Nevada	$12,198.38	$15,086.07
Arkansas	3,487.04	5,708.81	New Mexico	32,541.34	29,625.32
California	53,716.87	62,052.82	North Dakota	71.41	70.96
Colorado	52,372.26	53,759.07	Oklahoma	273.67	878.45
Florida	1,381.41	2,454.93	Oregon	35,612.30	42,559.52
Idaho	52,594.33	59,523.79	South Dakota	14,197.32	10,565.06
Kansas	919.10	1,224.64	Utah	34,869.10	33,760.42
Michigan	4.25	5.78	Washington	24,111.36	31,895.21
Minnesota	1,309.55	1,258.19	Wyoming	30,126.52	30,637.22
Montana	74,021.04	59,816.37			
Nebraska	3,183.31	4,075.89	Total	482,376.18	506,572.94

The appropriation act for the current year provided that 10 per cent of all national forest receipts of the fiscal year 1912 should be available for expenditure by the Secretary of Agriculture on roads and trails within the States in which the receipts were obtained. The amounts available under this provision are shown below. The roads and trails to be constructed with these sums will be primarily for the benefit of communities.

State or Territory.	Ten per cent for expenditure for roads, etc.	State or Territory.	Ten per cent for expenditure for roads, etc.
Arizona	$24,645.77	New Mexico	$11,850.13
Arkansas	2,283.52	North Dakota	28.38
California	24,821.13	Oklahoma	351.38
Colorado	21,503.63	Oregon	17,023.81
Florida	981.97	South Dakota	4,226.02
Idaho	23,809.52	Utah	13,504.17
Kansas	489.86	Washington	12,758.08
Michigan	2.31	Wyoming	12,254.88
Minnesota	503.27	Alaska	4,675.48
Montana	23,926.55		
Nebraska	1,630.36	Total	207,304.65
Nevada	6,034.43		

The States of Arizona and New Mexico will also receive a percentage of the 1912 receipts for their school funds proportionate to the school-land sections within national forests. The amount of this is estimated at $27,884.09 for Arizona and $8.326.22 for New Mexico. The total amount payable to States or expendable within States for the benefit of their citizens from the national forest receipts of the last fiscal year is therefore $750.087.90. The total amount of national forest gross earnings paid to the States in 1906, the first year in which any provision for payments to them of national forest funds was made, was $75.510.19. The aggregate sum of all such payments to date is approximately $2,850,000.

The share of the receipts which is now being paid over to the States from some of the forests is greater than the taxes which the lands would yield if they were entirely in private ownership. On the less developed forests the volume of use is still too low to make the returns to the States important; such forests would, however, yield little in taxes at the present time if they had never been set aside for national forest purposes.

As the great bulk of the timber, now too remote from transportation facilities to have a lumbering value, comes into demand the payments to the States will mount up rapidly. When a point is reached at which an equivalent of the total annual growth on the forests can be cut, the returns will be very large. It is shown later in the report that this possible annual yield is about 6,000.000.000 feet, which at the present stumpage rates would give a gross return of $15,000.000. Of this, under the present apportionment of 35 per cent, including the 10 per cent for roads, the States would receive $5.275.000 directly. Doubtless when the forests are self-supporting a new apportionment will be made. In addition it should be borne in mind that with the practice of forestry the returns will be permanently sustained, and that the lumber industries which will be occupied in manufacturing this annual product of the forest will distribute in the neighborhood of $50.000,000 a year in wages. The States are even now receiving, without cost to them, substantial sums paid from gross receipts, while the heavy burden of administration and protection is borne entirely by the Federal Government. If the forests were owned and protected by the States the income now derived from them would instantly be converted into a deficit. Only by abandoning all expectation of keeping the water, timber, and range resources of the forests permanent could a very large charge upon State funds be prevented.

During the past year there was made, in compliance with a requirement of the agricultural appropriation act for 1912, a classification of all expenditures of the Forest Service from the year 1900 to the year 1910, inclusive. The preparation of the statement called for by the law made necessary a line-by-line analysis of some 165,000 vouchers, covering the disbursement of over $16,000,000. One result was to show that the net cost of the national forests to the Government for the six years 1905 to 1910, inclusive, counting in all overhead charges, but deducting the value of all property and improvements on hand, was less than $600,000 per year. It was in 1905 that the Forest Service was put in charge of the national forests.

Against this net cost, as was pointed out in the report made to Congress embodying the results of the classification, must be set the public service rendered by protection and regulated use of the national forests, which at a very moderate estimate have a direct property value exceeding $2,000,000,000. Even under the exceptionally trying conditions of 1910, in which the difficulty of fire control, the extent of the fires, and the loss caused by fires was far greater than in any other year, over 75 per cent of all fires discovered were put out by the forest officers without extra help or expense. The stock industry alone has benefited by regulated grazing to an extent far exceeding the entire net cost of caring for the forests. The yearly value of water protection by the Forest Service is probably greater than the entire annual appropriation for its support. The timber on the forests is advancing in value at the rate of not less than $50,000,000 a year.

The summary of the classification of all expenditures and receipts for the 11-year period was shown as follows:

DEBITS.

(1) Total expenditures from Forest Service appropriations for forest work	$16, 657, 759. 98
(2) Expenditures for printing and binding bulletins, circulars, etc., paid from departmental appropriation for printing and binding	236, 667. 60
(3) Payment to States, refunds, and other miscellaneous disbursements under the general direction of the Forest Service	1, 817, 753. 45
Total expenditure	18, 712, 181. 03

CREDITS.

(*a*) **Receipts:**		
(1) From national forest resources ($8,346,967.20 less $208,844.51 collected by Interior Department	$8, 138, 122. 63	
(2) From miscellaneous sources	7, 358. 23	
(3) From contributions for cooperative work with the Forest Service	109, 846. 63	
		$8, 255, 327. 49

(*b*) Improvements and property on hand June 30, 1910:			
(1) Permanent improvements other than equipment	$1, 864, 226. 63		
(2) Equipment and other nonexpendable property	636, 816. 40		
(3) Supplies and expendable property on hand June 30, 1910 (estimated)	96, 325. 08		
		$2, 597, 368. 71	
			$10, 852, 696.. 20
Balance			7, 859, 484. 83

Debit items 2 and 3 above, comprising as they do expenditures from departmental funds for printing and binding, payments to States from national forest receipts, and refunds of deposits, are of course not properly chargeable as expenditures by the Forest Service for its own work. The balance shown above includes both these items and disbursements from appropriations expendable only for purposes distinct from national forest administration, protection, and improvement. If all disbursements from appropriations available for the latter purpose had been used for this purpose solely, the net balance shown above would become $4,321,655.01. In point of fact the net cost was less. The annual expenditures for administering, protecting, and improving the national forests (including that part of the cost of the Washington office fairly chargeable against national forest administration) were reported as follows:

Fiscal year.	Expenditures.	Fiscal year.	Expenditures.
1905	$509,186.68	1909	$3,554,896.03
1906	956,999.67	1910	4,351,152.55
1907	1,538,419.31		
1908	3,118,267.21	Total	14,028,921.45

If the balance is struck by deducting the credits tabulated above from this total, the entire net cost of national forest administration and protection since the Forest Service took charge becomes $3,176,225.25, or under $600,000 per year.

Among other facts developed by the classification may be mentioned the following:

(1) Out of the total expenditures of $16,657,759.98 approximately $8,000,000 was disbursed in salaries and wages for work on the forests, while over $550,000 more was disbursed in salaries to persons engaged in the work of national forest administration and stationed in the districts but not on the forests.

(2) The total expenditure for salaries and wages of persons attached to the Washington office (though often employed in work outside of the city of Washington) for the 11-year period was not quite $2,500,000. This sum covers the cost of general investigations, general administration, and inspection of national-forest work.

(3) Expenditures for travel during the entire 11 years was a little less than $1,350,000, or 8.07 per cent of the total expenditures. This

includes all charges for transportation and subsistence of men on field trips, whether in connection with national forest administrative work, inspection, or investigative studies. In the years prior to the transfer of the national forests to the Forest Service travel expenditures ranged from 22.14 to 13.71 per cent of the total yearly expenditures. For the years 1905 to 1910, inclusive, the expenditures for travel ranged from 11.54 per cent in 1905 to 6.56 per cent in 1910.

(4) The expenditures for rent during the 11 years totaled a little less than $330,000, or 1.98 per cent of all expenditures, of which slightly over $145,000 was for rent in Washington and slightly less than $185,000 for rent out of Washington.

(5) Classified under "Expenditures in Washington," "Expenditures out of Washington," and "Expenditures in and out of Washington" (i. e., freight and drayage, express, and telegraph charges on goods shipped or messages sent from or to Washington), the total expenditures for the 11 years, without deductions for repayments, were as follows:

In Washington	$3, 292, 937. 62
Out of Washington	13, 126, 605. 45
In and out of Washington	284, 533. 92
Total	16, 704, 076. 99

(6) A statement of expenditures "for compensation of persons engaged in writing descriptive or other matter for publication" and "for lecturers" was required. It was shown that the cost of all work chargeable under these heads was relatively small, and that the general line followed in diffusing information was not materially different in character from that of other bureaus. The salary disbursements for persons employed partly or wholly in editorial work ranged from $419.73 in the fiscal year 1901 to $6,600 in the fiscal year 1910. No payments whatever were made to outside writers for the preparation of matter for publication by any outside agency, nor were any payments made to newspapers or magazines to secure publication of descriptive or other matter. No payments whatever were made, directly or indirectly, to procure the delivery of lectures by any persons not officially connected with the Forest Service, nor was a lecture bureau maintained in the service. So far as practicable, however, the service has always sought to diffuse information concerning its work and the results of its investigations by all legitimate means. To this end it has, at an insignificant cost, prepared and furnished information usable by newspapers along with the preparation of official publications, both technical and popular. The object sought has been throughout to bring about the better handling of forests all over the country.

The heavy burden and large cost necessary to compile the information set forth above would have precluded a demonstration of the facts brought out had the statement not been required by law. It is, however, a matter of no small importance that this exhaustive classification of expenditures has been made, since it affords a complete and precise demonstration of the use actually made of all appropriations during this entire period. Statements to the effect that the Forest Service has spent most of the money appropriated for it for purposes other than the care of the national forests; that it has maintained an extravagantly large force of office employees instead of doing field work; that its expenditures for travel, rent, and similar purposes have been excessive; that it has subsidized newspapers, magazines, or magazine and newspaper writers; and that it has maintained a lecture bureau or subsidized lecturers, are entirely disproved by a complete showing which covers all disbursements of the entire period.

The report in full upon these matters was published as House Document No. 681, Sixty-second Congress, second session.

ORGANIZATION AND PERSONNEL.

No important changes in organization were made during the year. The task was rather to strengthen the efficiency of the existing organization in handling all branches of work. In this direction there was a very definite accomplishment. The output of every unit in the service was materially enhanced. In 1911 the supervisory force in the national forest districts was very substantially reduced. The object was to effect economy and to determine by actual test the minimum force absolutely necessary for efficient supervision and inspection. The business of the service, however, is constantly increasing, so that the supervisory force was during the year strained almost to a breaking point. The result has been to show what is needed for the best and most economical organization. In several places additional help must be provided for adequate field inspection. The Forest Service is distinctly a field organization. Its work is very diversified and scattered over an enormous country, requiring a large number of men, with heavy responsibilities. The check on the work must come from field inspection. This is the only way to maintain adequate standards of individual efficiency. With a few changes and added strength to the inspection force at certain points, the present organization is able to handle the present volume of business. As the business increases, the organization must naturally respond to the new conditions.

The greatest attention was paid to the organization of the fire-protection work. The fundamental aim is to prevent fires from starting, but in case of fire to be prepared to meet whatever situation may arise. The present organization gives each supervisor a limited force of permanent statutory roll rangers, each in charge of a division of the forest. This force is increased during the dangerous fire season by the employment of temporary help as the conditions require and as far as the available money permits. The larger this force can be made during the fire season the better the protection. Normally there ought to be at least one patrolman to every 10,000 acres during the danger season where any serious hazard exists. The service actually employs about one man to each 60,000 acres. The force is not regularly distributed, the most men being placed where the hazard and property exposure are greatest.

The winter force has been reduced to the minimum necessary to maintain the framework of a permanent organization. This enables a greater expenditure during the season of fire danger. In working out this adjustment the presence of statutory positions acts as a distinct handicap, since it prevents an organization of sufficient elasticity to meet special and changing conditions in the best manner.

The results of careful organization of the protective force have been remarkable. Over and over again the men have been put to the test and met it with great credit. Careful planning, a closely coordinated organization of alert, capable rangers, and proper equipment for fighting fires have resulted in the ability to mobilize with great swiftness the necessary force to attack fire. With more trails and telephone lines and with sufficient funds to employ a larger force of guards where needed, under the special conditions of the season, the forests could be rendered very safe. Until these are provided the organization must be considered incomplete and the hazard of dangerous fires still uncomfortably great.

Special attention was also given during the year to the organization of the investigative work of the service. The broad and varied field covered by investigations, carried constantly into greater detail, necessitates a careful coordination of the various scientific activities of the service, in order to insure the utilization of all available knowledge and facilities for each project, to correlate all projects, prevent duplication, and to provide for taking the most important problems first and in the right way. These objects have been secured by constituting a central committee on investigative work, composed of one man from each of the three branches of silviculture, grazing, and products. This committee, supplemented by similar committees in the six districts, acts in an advisory capacity to the Forester in reviewing all scientific projects in advance, with reference to their practical purpose, relative need, cost, the avoidance of duplication, etc. The plan has resulted in very greatly increasing the efficiency and reducing the cost of the investigative work.

The plan of concentrating certain phases of the research work at laboratories and permanent experimental headquarters has been continued. Many problems requiring repeated and careful observations can not be conducted except through permanent stations. Already such stations exist on the Coconino, Pike, and Rio Grande National Forests. During the year two new stations were established—the Priest River Station, on the Kaniksu National Forest, in Idaho, and the Feather River Station, on the Plumas National Forest, in California. A third, the Utah Station, on the Manti National Forest, in Utah, was established after the close of the year. The Forest Service has also undertaken cooperative experimental work with the State of Minnesota at the Cloquet Forest Experimental Station, at Cloquet, Minn. This will secure information applicable to the management of the national forests in Minnesota and Michigan.

As is natural in any large organization, personnel changes are numerous. One of the most serious personnel problems is that created by the loss of experienced and valuable men who leave the service to accept more lucrative positions. During the year 23 experienced and well-trained men, holding positions of large responsibility, left the service for pecuniary reasons. This does not include the losses for the same reason among the rangers.

The number and classification of the forest force on June 30, 1912, was as follows:

Supervisors	147
Deputy supervisors	92
Rangers	1,393
Guards	780
Forest examiners and forest assistants	156
Lumber and mining experts, engineers, land examiners, hunters, etc	156
Clerks	171
Total	2,895

To facilitate administration various changes were made in the national forest units. In Oregon the Ochoco Forest was formed from portions of the Deschutes and the Malheur Forests; the Santiam, from portions of the Oregon and Cascade; the Paulina, from parts of the Deschutes, Fremont, Umpqua, Cascade, and Crater; and the Minam Forest, from a part of the Wallowa. In Washington the Okanogan Forest was formed by dividing the Chelan, and in Wyoming the Bridger and the Washakie by dividing the Bonneville. In Idaho the Selway Forest was formed from parts of the Clearwater and the Nezperce, and the St. Joe from parts of the Coeur d'Alene and the Clearwater. The Durango Forest in Colorado was formed from the San Juan; the Harney, in South Dakota, from the Black Hills, with an addition of 58,730 acres of new territory; and the Ruby, in Nevada, from the Humboldt, with 12,820 acres of new territory. The Garces Forest, in Arizona, was merged with the Coronado. The Choctawhatchee and the Ocala Forests, in Florida, were combined under the new name of the Florida National Forest. With these changes the forests at the close of the year numbered 163. The Luquillo Forest, in Porto Rico, is not under administration. It was found possible to continue as single units of administration the Tongass and Chugach Forests, in Alaska; the Toiyabe and Moapa Forests, in Nevada; the Manzano and Zuni Forests, in New Mexico; the Michigan and Marquette Forests, in Michigan; and the Dakota and Sioux Forests, in North and South Dakota and Montana. The average forest area was reduced from 1,070,545 acres to 1,003,700 acres. As business increases smaller units are needed. At the end of the fiscal year there were 157 forest units. These were in charge of 147 forest supervisors and 10 forest officers who were temporarily in charge pending appointment of supervisors.

At the end of the fiscal year 1912 there were 1,393 rangers on the forests, as against 1,424 at the end of 1911, a decrease of 31; and 780 temporary fire guards, as against 526 June 30, 1911, an increase of 254. This is for better fire protection by reducing the permanent and increasing the temporary force. The number of deputy forest supervisors was reduced by 8.

Temporary fire guards are appointed, to the extent permitted by the funds available, as the increasing risk of fire due to the oncoming of the fire season demands. The protective force is largest when the fire season is at its height. Owing to the fact that the act providing appropriations for the fiscal year 1913 did not become law until August 10, and that in the interval between the close of the fiscal year 1912 and that date, the period of normally heaviest expenditures, there was available only a sum equal to the average expenditure of the entire previous year during an equal interval of time, it was necessary to postpone the enlargement of the protective force to its full strength until late in the season. On August 20, 1912, the total number of Forest Service employees on duty was 4,097, as against 3,541 on June 30. The increase was almost entirely in the forest force.

The Forest Service recognized at the start that its officers not only must be familiar with the regions in which they worked, but also must be in sympathy with the problems and interests of the people. An early provision of law required the selection of local officers, so far as possible, from residents of the States concerned. This has been scrupulously followed. Thus in case of the forest rangers, civil-service examinations are held only in the States in which national forests are located, and the regulations require that no nonresident eligibles be selected in any State or Territory as long as there is a register of resident eligibles. If, however, this register is exhausted, nonresident eligibles who took the examination within the State may be selected. Of the 1,393 rangers on the rolls on June 30, 1912, only 11 were appointees from the nonresident list.

The higher positions, like that of supervisor and district forester, are all filled by promotion from the position of ranger, forest assistant, or other positions in the service. When a vacancy in a supervisorship occurs the best available man, from the standpoint of proved ability, experience, and knowledge of conditions, is selected to fill it. The position may be filled either by promotion from the local force or sometimes by a transfer from another forest.

No one is ever put into an important executive position like that of supervisor, deputy supervisor, or the positions in the district offices, who has not had adequate practical experience in local conditions. The selection of men by promotion in the regular force absolutely guarantees this.

By an act of Congress approved March 11, 1912, the provisions of the act of May 30, 1908, under which compensation is made to employees of certain Government services who are engaged in hazardous duties, were made to apply to members of the Forest Service engaged in hazardous work. Under this law an employee so injured is entitled to receive for one year from the date of injury, unless such employee in the opinion of the Secretary of Commerce and Labor be sooner able to resume work, the same pay as if he continued to be employed. If death results within the year, dependent relatives of the degrees of consanguinity prescribed by the act are entitled to receive the balance of pay which would have been due for the remainder of the year.

THE NATIONAL FORESTS.

AREA AND BOUNDARIES.

The exterior boundaries of the national forests within the more important timber zones have assumed a fairly stable condition. It will take another year, however, to complete the boundary adjustments now under way. Their completion will, it is hoped, put practically all of the boundaries in a reasonably permanent shape.

Thirty-nine proclamations and Executive orders affecting the boundaries were issued. Two of these created interforest transfers between the Rainier and the Snoqualmie National Forests, Washington. One created the Devil Postpile National Monument within the Sierra National Forest, California. Two modified previous proclamations to permit of the selection of land by the States of South Dakota and Idaho. Eight Executive orders retransferred lands from as many national forests of Arizona, New Mexico, and California to Indian reservations. The remaining 26 eliminated 577,591 acres of land and added 153,414 acres. In addition to the reduction by these eliminations the national forest area was decreased by a retransfer of 2,497,840 acres of land to the several Indian reservations of which they originally formed parts.

These various readjustments in boundaries (together with the addition of 84,970 acres and the elimination of 364,820 acres effected by the 13 proclamations signed previous to the beginning of the fiscal year 1912, but which did not become effective until July 1, 1911, as stated in last year's report) effect a net reduction in the total national forest area of the United States of 3,201,867 acres. This leaves the gross area on July 1, 1912, under national forest control at 187,406,376 acres, and the net area at 165,027,163 acres, as shown by States in the following table:

National forest areas, in acres, by States.

State or Territory.	Gross area June 30, 1911.	Changes during fiscal year.		Gross area June 30, 1912.	Alienated.	Net area.
		Additions.	Eliminations.			
Arizona	14,898,000		1,558,610	13,339,390	877,133	12,462,257
Arkansas	2,225,890			2,225,890	1,017,108	1,208,782
California	27,735,455	26,920	195,300	27,567,075	6,676,130	20,890,945
Colorado	14,761,900		26,440	14,735,460	1,458,086	13,277,374
Florida	674,970			674,970	366,560	308,410
Idaho	19,643,355		92,528	19,550,827	1,573,373	17,977,454
Kansas	303,937			303,937	148,201	155,736
Michigan	163,771			163,771	79,060	84,711
Minnesota	1,204,750			1,204,750	358,123	846,627
Montana	19,305,100		241,330	19,063,770	2,936,412	16,127,358
Nebraska	556,700			556,700	35,795	520,905
Nevada	5,650,347	83,155	177,992	5,555,510	260,891	5,294,619
New Mexico	11,111,300		937,410	10,173,890	1,354,482	8,819,408
North Dakota	13,920			13,920	7,506	6,414
Oklahoma	61,640			61,640	160	61,480
Oregon	16,148,900		125,480	16,023,420	2,364,741	13,658,679
South Dakota	1,287,700	67,730	17,680	1,337,750	180,866	1,156,884
Utah	7,667,585	60,579	7,081	7,721,083	433,367	7,287,716
Washington	11,684,680		320	11,684,360	1,848,214	9,836,146
Wyoming	8,693,543		60,080	8,633,463	264,440	8,369,023
Total, United States	163,793,443	238,384	3,440,251	160,591,576	22,240,648	138,350,928
Alaska	26,748,850			26,748,850	105,590	26,643,260
Porto Rico	65,950			65,950	32,975	32,975
Grand total	190,608,243	238,384	3,440,251	187,406,376	22,379,213	165,027,163

EXCHANGE OF LANDS.

On February 15, 1912, the President signed a proclamation carrying into effect an agreement entered into January 4, 1910, between the Forester, on behalf of the Department of Agriculture, and the State of South Dakota, providing for the exchange by the State of school lands within the then Black Hills National Forest for other lands equivalent in acreage and value lying along and within the boundaries of the national forest. The area involved in the agreement amounted to 60,143.92 acres. To satisfy the State's equity the proclamations affecting the Harney and the Sioux National Forests were modified to permit the State to select 47,937.65 acres from the Harney Forest and 12,206.27 acres from the Sioux.

A similar proclamation was signed June 4, 1912, completing an agreement entered into July 10, 1911, affecting the St. Joe National Forest, Idaho. There is also now under way an examination of the unsurveyed school sections within all the national forests of Idaho in conformity with an agreement entered into by the State and the Department of Agriculture on October 4, 1911, whereby the State is to relinquish its claim to the unsurveyed sections within the several national forests and select in lieu thereof one or more areas lying along and within the present boundaries of the national forests, equivalent in acreage and value to the lands surrendered.

The act of March 4, 1911 (Public, No. 513), authorized the Secretary of the Interior to exchange desert lands therein described for lands owned by the Portland Land Co. within the national forests of Oregon. In accordance with the provisions of the act an examination was made by the Forest Service of the lands to be reconveyed to the United States and a recommendation that the exchange be made has been forwarded to the Secretary of the Interior.

Under provisions of the act of February 28, 1911 (37 Stat., 960), Messrs. G. W. Finnup and James Cowgill made application for the exchange of private lands within the Kansas National Forest for other lands within the national forest. Both applications were approved and forwarded to the Secretary of the Interior.

Other exchange projects are under way. The governor of Montana has expressed a desire to enter into an agreement similar to the Idaho agreement for the exchange of the Montana school lands for national forest lands. A bill is pending in Congress looking to the exchange of State and Government lands in Michigan. Several other less important applications for exchanges made by companies and individuals are pending. The basis of these various negotiations is the exchange of lands approximately equal in acreage and value.

The advantages of such exchanges of land both to the States or individuals and to the Forest Service scarcely need pointing out. The States will in each case secure valuable areas of land in compact form in lieu of scattered sections. This will enable them to secure a greater revenue from the areas both by State management of the timbered lands and by more advantageous leases of the grazing areas. The Forest Service benefits from such exchanges principally because it is advantageous from an administrative standpoint to have the national forest units as solid as possible.

In view of these mutual advantages opportunity for similar exchanges both with States and with individuals will be sought. Other States may eventually find it desirable to effect such exchanges. No need exists for exchanges in Arizona and New Mexico, as the enabling acts of these States provide for the administration of the school lands within the national forests by the Forest Service, the State receiving a pro rata of the receipts.

The agreements for exchange have so far applied only to school sections which were unsurveyed at the time of the creation of the national forests. This is because there is some doubt as to the power of the State to exchange sections to which it had acquired absolute title prior to their inclusion within the forest. This doubt should be removed by congressional action. Several bills have already been introduced in Congress for this purpose, but so far have not received favorable consideration.

CLAIMS AND SETTLEMENT.

Aside from the perfecting of claims initiated before the forests were proclaimed, further reductions in net area through private acquisition of lands within the forests can, under existing laws, take place only (1) through new mining claims, and (2) through agricultural settlement on lands listed by the Secretary of Agriculture in accordance with the forest homestead act.

MINING CLAIMS ON NATIONAL FORESTS.

Mining claims are perfected and new mining claims initiated under the same laws which apply on the unreserved public domain, and no restriction of any kind is imposed on the prospector in his search for valuable minerals. He may go freely where he pleases and may stake out his claim wherever he finds indications that seem to him worth following up. If he desires to build a cabin on Government land not included within the limits of his claim, he is given a free occupancy permit and free timber for its construction. On his own claim he need only comply with the law to remain in undisturbed possession for as long a time as he may desire before making final proof. Both the timber and the forage on it are reserved for his use, in so far as he may need either in connection with the development of his claim; and if the supply on his own claim is not sufficient for his needs, free use of national forest timber, and of range for his work animals. may be had for the asking. When he desires to make final proof no requirements are imposed upon him other than those laid down by the general mining laws for all public lands. Moreover, by the protection which national forest administration affords against fire and by the provision made for permanence of timber supplies for local needs, he gains both in security against fire loss and in insurance against the danger of having to bring timber from distant markets at a heavy cost in order to work his mine.

Yet the charge is frequently made that the national forests are closed to mining development and that restrictions have, without legal warrant, been imposed upon the patenting of mining claims within them.

In so far as these charges are not the result of misapprehensions or misrepresentations, they arise from the fact that before claims to land within national forests are patented they are examined by forest officers, and reports upon them are submitted to the Interior Department, which has sole jurisdiction over all questions of land title. These reports are made in accordance with the request of the Secretary of the Interior. Doubtful claims bearing evidence of fraud or failure to comply with the requirements of the mining laws are always examined on the ground by a practical miner or mining expert, and adverse recommendations are made only when such officers certify to the malefides of the case.

In reporting upon mining claims the question first considered is whether the patenting of the claim will in any way affect adversely the interest of the public in the land for national forest purposes. If the claim is not located on land which is valuable for its timber or of high value for purposes other than mining, and if it was apparently taken in good faith for mining purposes and the mineral laws have been complied with, the claim is reported upon favorably as not prejudicial to national forest interests, leaving further consideration of it to the General Land Office on the basis of its customary requirement of proofs in the form of affidavits offered by the claimant and his witnesses.

When, however, the examination of the land by a forest officer develops the fact that a public interest is involved because of the value of the land for national forest purposes—that is, for the present stand or permanent production of timber, the protection of waterflows, use for water-power development or some other form of occupancy under special-use permit, or public use—a favorable report is made to the Land Office only after it has been examined by a mineral examiner of certified civil service standing or by a practical miner competent to pass upon the questions involved. Adverse reports on the ground that the requirements have not been complied with (the only ground, of course, on which any claim is ever reported adversely) are never made unless the claim has been examined by a mineral examiner or practical miner. Further, before an adverse report is transmitted to the Land Office the showing of facts made by the examiner is scrutinized, with reference to the evidence submitted and the law involved, by the district assistant to the Solicitor of the Department of Agriculture; and only if this officer is satisfied that the evidence offered is sufficient to prove failure to comply with the mining laws is the Chief of Field Division of the General Land Office notified that the Forest Service desires to protest the claim.

Such notification is in no sense a rejection of the claim. It merely places before the Land Office the facts as found upon the ground by the examining officer and the conclusions which the Forest Service believes to be warranted by them. The Commissioner of the General Land Office decides, with the evidence before him, whether a hearing will be ordered. His action is necessarily largely influenced by the recommendation of the Chief of Field Division, but is, of course, subject to review by the Secretary of the Interior.

The General Land Office is, under the laws of Congress, a land court. The objectors to the present procedure practically deny the right of the Government to appear before that court on behalf of the people of the United States, as against a private claimant to mineral lands, in order to introduce evidence of noncompliance with the law under which the claimant seeks title. It is alleged that because the Department of Agriculture is not refused the right accorded any private citizen to seek cancellation of a claim thought to be illegal, when an adverse interest exists, the mining industry is oppressed and a bureaucratic despotism is permitted to overthrow and displace the law.

To deny the right of the public to its day in court would be to open the door to frauds of every conceivable character. It is an undeniable fact that there is a great deal of very valuable land in the national forests. Land valuable for agriculture is open to entry upon regular classification. The requirement of prior classification makes it impossible to use the forest homestead law as a vehicle for fraud. No such restriction is placed upon mineral entries; the final report made upon these claims is the only barrier to securing under the mineral laws, by means of false representations, patent to lands of large value for other purposes.

The system of requiring reports on each claim before patent issues is necessary to preserve the integrity of the national forests, and is no less necessary to the preservation and good standing of the mining industry itself. Cases are frequent of "wildcat" companies seeking to patent extensive areas of land barren of mineral or other value for no other purpose than that of deceiving the innocent investor. In such cases the patent issued by the Government is submitted as proof of the value of the land, and investments are made based upon the belief that the Government has required of the promoters a fair compliance with the law. A system which meets with bitter protest and vilification from such "wildcat" operators surely performs a duty to the public, and is the friend of every legitimate mining enterprise.

But the foregoing is only one of many classes of frauds which are attempted under the guise of the mining laws. In every case the real miner is the victim rather than the beneficiary. In very few instances are doubtful operations promoted by practical miners or prospectors. A few recent examples will serve to illustrate this very important fact.

A supposedly rich mineral strike was made in one of the national forests, and there was a great rush of people to that vicinity. Indications were favorable to the establishment of a permanent gold mining camp, and immediately people interested not directly in mining, but in other related enterprises, flocked to the vicinity of the new strike and began to establish settlements and places of business. Owing to the topography of the country there was only one favorable place for establishing a town, and this place was immediately covered by mining locations. These mining claims were thereupon placed in the hands of professional town-site boomers, who surveyed the land off into building lots under the guise of mining leases, which leases carried an option of sale. By distorting the purpose of the mining laws to suit their special case these speculators were enabled to retard, but not actually to prevent, bona fide settlement and the establishment of business much needed in connection with the mineral development of the country. It came out in the proofs regarding this case that the leveling done by the holders of these mining leases, who in fact were the actual purchasers of the ground, was construed by the town-site speculators as mineral development, as was also the grading, and the digging of cellars, etc. The worst feature was that there was no means whereby the purchasers of these lots could secure an actual title to the land purchased, the deeds being only quitclaim deeds carrying no further obligation on the part of the town-site company or the locators of the claims. There actually exist in Nevada, at the present time, town sites portions of which are upon mining locations the validity of which can probably never be established, and the holders of the quitclaim deeds for the surface of these claims will never be able to acquire actual title to the land until the mining claims are held to be invalid and the residents enabled to proceed to secure title to their holdings under the town-site laws. Here the town-site boomer misused the mining laws.

In another instance a large live-stock company purchased the majority of the stock grazed in a certain section of the country splendidly adapted for cattle range, except that water was scarce, the only available supply consisting of small lakes or ponds and small springs. This cattle company, in order to establish a complete monopoly of the range, proceeded to put mining locations and mill sites upon all the watering places, with the exception of two or three which were covered by scrip location. No mineral development was, however, attempted on any of these claims. The locations were upon formations containing no mineral showing whatever, and alleged development work consisted of tunneling and trenching for the collection of water and in the building of corrals, tanks, and pipe lines for the handling and watering of the cattle. In this way water holes were secured which gave control of approximately 500,000 acres of valuable range. Here the cattlemen misused the mining laws where there was no one to protest or report.

In another instance a sheepman was occupying and grazing a certain section of range within a national forest in a country mineralized to some extent, and in which the water supply was limited. Some old placer diggings existed in a certain canyon within the vicinity of a small spring, which placer diggings had been abandoned for years, with the exeception of the fact that some Chinamen, when out of anything else to do, would occasionally work the claim for what they could get out of it. The sheepman proceeded to locate a mining claim covering the spring and the old placer diggings, established a shearing or dipping corral, and applied for patent to the ground, claiming as his $500 worth of development the work done by persons who had abandoned the claim as not of sufficient mineral value to be worth further consideration, and work done by the Chinamen mentioned. Here the sheepman attempted to misuse the mining laws.

Another illustration is a case in which a large power company attempted to procure title to a valuable power site by locating mining claims extending up and down the stream upon which the plant is located. These locations were placer locations and the mineral alleged to exist in the claims was asserted to be lime, and the claims were known as the Limestone Placers. A Government expert made examination of these claims and submitted an adverse report. Here the hydro-electric power company misused the mining law.

Not far from this last-mentioned case some individuals made application for the patenting of some placer locations, alleging the existence of valuable minerals. The location happened to be within a national forest, and, under the regulations of the two departments, the Forest Service made an investigation in connection with a representative of the General Land Office, and the following facts appeared: There was no showing of mineral whatever upon the locations except a sort of shale, which the locators alleged had some value for cement making. In the application of the patent the locators alleged that $1,500 worth of work had been done. Investigation showed that all the work that had been performed was in grading for driveways and for building locations, and that it actually amounted to less than $300 at a liberal estimate. It further developed that the locators had incorporated a company for the exploitation and sale of building sites for summer homes, this location being in the mountains, within easy reach of a thickly populated section of country, and directly on an electric car line leading from a city of considerable size. Here the dealer in suburban summer homes sought to misuse the mining laws.

Not long since a large mining company, operating mines just upon the border of one of the national forests, applied for the purchase of a tract of timber situated within the forest, desiring and in fact being in actual need of the timber in its mining operations. The local forest officer proceeded with the usual preliminaries necessary in making a sale. While he was doing so it became known in the neighborhood generally that the mining company was making a purchase of the timber on a certain tract of land; whereupon some individuals immediately proceeded to the tract and placed thereon mineral locations, alleging the existence of valuable minerals, and endeavored to compel the mining company to pay them as well as the Government for the timber. Failing in this plan of extortion, the locators abandoned the claims, admitting that all they wanted was the timber. Here the grafter tried to misuse the mining law and exact tribute from the miner.

In a California case an effort was made by means of mining locations to secure control of the most valuable and important bodies of timber in one of the national forests. One man, with the aid of two or three others and the use of the names of others, covered thousands of acres of valuable timber land by means of placer locations. The report by Government experts and the decision of the Commissioner of the General Land Office held the claims to be invalid because of insufficiency of discovery and the absence of showing of valuable mineral deposits. Here the timber grabber tried to misuse the mining law.

The men who engage in mining as a legitimate permanent industry have no incentive to evade the law, since they are not limited as to the time within which they must apply for patent but are at liberty to develop the ground and extract the mineral to any extent, subject only to the mining laws of the State. The miner has no trouble in applying for patent under the mining laws for ground chiefly valuable for mineral. The man who has trouble is the man who tries to secure, under cover of the mining laws, a town site, a summer resort, valuable timberland, a water-power site, watering places in the desert, or mineral springs in the mountains. Such frauds, in no sense connected with the mining industry, would thrive and multiply if mining claims were not reported upon before being passed.

Whether or not legitimate mining development has been handicapped by the examinations made in the years since the making of such examinations began may be judged in the light of the fact that more than four out of every five of the claims examined during the entire period have been reported upon favorably.

The present procedure is on all fours with that followed by the Interior Department with respect to land withdrawals by the Government for other than national forest purposes, on which all claims are investigated by the department before they are allowed to go to patent, except where an election to take surface title is filed in cases covered by the act of March 3, 1909 (35 Stat., 844), and the only question involved is the coal character of the land.

When mining claims which appear to be invalid interfere with national forest administration, it becomes necessary for the Forest Service to apply for their cancellation by the Interior Department. In making such application the Forest Service merely exercises the same right which the law gives any private individual to contest a claim which does not conform to the law before patent is applied for. Except for such cases, the question of the validity of claims is raised only upon notification to the Forest Service by the General Land Office that patent is sought by the claimant.

Under existing laws the Forest Service is powerless to protect permittees who are allowed to occupy national forest lands for water-power development and other purposes against the location of mining claims upon the areas covered by their permits. It is exceedingly desirable that legal recognition should be given to the principle of highest use in such cases. Mining use does not necessarily preclude other forms of use, nor is there any inherent reason why the locator of a mining claim on public land should be given any right upon the surface of his claim beyond the right to make such use of it as is required for mining development. It would be entirely practicable to provide for simultaneous development of more than one resource without permitting the developer of any resource to levy tribute upon another for privileges which he does not need.

ACTION UPON CLAIMS OF ALL KINDS.

Field examinations of claims furnished a basis for reports to the General Land Office as follows:

Reports to the General Land Office on unpatented claims.

Character of report.	Homestead.	Desert land.	Timber and stone.	Mineral entry.	Coal entry.	Miscellaneous.	Total.
Favorable	737	24	27	718	18	10	1,534
Unfavorable	147	6	2	144	8	28	335
Total	884	30	29	862	26	38	1,869

Action upon claims to national forest land before the Department of the Interior resulted as follows:

Claims to national forest land disposed of by the Department of the Interior.

Character of action.	Homestead.	Desert land.	Timber and stone.	Mineral entry.	Coal entry.	Miscellaneous.	Total.
Patent issued	903	11	139	901	20	14	1,988
Canceled	407	11	27	220	26	37	728
Total	1,310	22	166	1,121	46	51	2,716

AGRICULTURAL SETTLEMENT.

NEED FOR SETTLERS IN THE NATIONAL FORESTS.—The Forest Service has always recognized the importance of agricultural development of all lands within the national forests which will make the largest returns to general prosperity under cultivation. It has also desired and steadfastly sought that such lands be given to home seekers as freeholds on condition only of bona fide homesteading. It was for this reason that the forest homestead act of June 11, 1906, was introduced at the request of the Forest Service and its passage strongly advocated.

The forests were established in order that their resources might be developed and used in a way to contribute in the greatest measure to the public good. The fundamental aim, as interpreted by the Forest Service, is to put to its most productive use every foot of land in the forests. Those areas most valuable for agriculture are to be used for that purpose; those most valuable for mining to go to the miner; those most valuable as water-power sites or for irrigation to be put to such use, and so on. There can be only one way to accomplish this development, and that is to get farmers on the farm land, miners to prospect and develop mines, water-power companies to build construction works, lumbermen to buy timber, stockmen to put in their herds to feed on the grass. In other words, people are needed in the forests to use the resources. Furthermore, the greatest single task of the Government is to prevent forest fires. That is fundamental to the purpose of producing timber. The service has its organized force of rangers and guards, recruited largely from those living in or near the forest, for it is these men who know the conditions and know how to fight the fire menace. But in addition to the organized regular force the service must have a second line of defense in case fires start. With settlers scattered through the forest assistance is secured in locating fires. Telephones are attached to the ranches and word is sent by the settlers to the forest officers. In case of need the settlers help in putting out the fires. It is to the settler also that the service turns for labor on a great deal of the work of building roads, trails, and other improvements. In short, the plan of development of the forest by the Government requires exactly what the settlers can give; hence there is a powerful reason for opening up agricultural land for these purposes as well as for the best economic development of the country.

CHARACTER OF AGRICULTURAL LAND IN THE FORESTS.—The national forests are located in the mountains. They include the highest and most rugged portions of the Rocky Mountains, the Sierra Nevada, and the Cascade and Coast Ranges. Their boundaries were drawn to comprise land suited to tree growth and for water protection. The large bodies of agricultural lands in the foothills have been excluded. Therefore most of such agricultural land as occurs is located along the narrow valleys of the mountain rivers and streams and on occasional benches, coves, and swales, where soil has collected and the topography and climate permit cultivation. A great deal of the best land, except areas under heavy timber, has already been taken up; some of it before the creation of the forests and some under the forest homestead law. There are only a few areas containing solid blocks of agricultural land of any extent, and these are in nearly all cases covered with very heavy timber. Most of the agricultural land left in the forests is in small scattered units.

The larger areas of agricultural land still covered with heavy timber are mostly situated in the forests of northern Montana, Idaho, Washington, and Oregon. These areas will be cut over as rapidly as possible and then opened to entry. On portions of the above-mentioned land the soil is exceedingly good and should make productive farms.

Another group of lands of agricultural possibilities occurs in the semiarid Southwest. There are some bodies of land at the base of the mountains which are suited topographically and by soil for agriculture, but water is entirely lacking. They can hardly be called agricultural at present, for water is quite as important an element in soil as nitrogen or any other chemical constituent. If water can be found these lands will be promptly classified as agricultural and opened to entry.

The rest of the agricultural land in the forests is in small units. The home seeker finds that the best open meadows and swales, the best flats at the confluence of streams, and the benches presenting the easiest conditions of cultivation have already been for the most part taken up. There remain still many scattered plots less accessible to existing roads, higher in the mountains and with less favorable climate, which are susceptible of cultivation. But the prospective settler must not expect to find a Sacramento Valley in the high Sierras nor a Willamette Valley in the high Cascades.

The statement has been frequently made by opponents of national forestry that settlers are leaving the country for Canada because the national forests are practically closed to settlement. In the first place, the national forests are not practically closed to settlement, so far as there is agricultural land in them; but the real reason settlers go to Canada is because there is more vacant land there of the kind they seek. A man seeking wheatland and flat farming prefers Canadian land of this character to a mountainous tract with uncertain conditions of transportation. It is the difference in conditions that takes men to Canada. Agricultural lands simply do not exist in the national forests which can compete in quantity and quality with the Canadian wheat fields, just as no settler would go up 6,000 feet in the Rocky Mountains for a strip of aspen land if he could get a free farm in North Dakota.

The total amount of agricultural land in the national forests not yet taken up will aggregate about 4,000,000 acres, of which a large amount is under heavy timber. The statement that there are many million acres of agricultural lands in the forests not under merchantable timber is contrary to the facts. While the exact figures will not be available until the classification of lands now in process has been completed, the data above given are based on careful estimates by the individual forest supervisors, from their knowledge of local conditions, and are liberal. One illustration may be taken from the work done by the Forest Service and Idaho Land Board in their classification of State school land in Idaho, looking to an exchange with the Government. The school sections are scattered evenly through the forest. So far, 375,000 acres has been jointly classified, and only 1 per cent has been found to be nontimbered agricultural land.

PRIVATE LANDS IN THE FORESTS.—Many persons have been misled by the presence of private lands in the forests. It frequently happens that persons passing through a forest see a great deal of good agricultural land lying undeveloped and assume that because it is within the boundaries of the forest it must be Government land, when in point of fact it is privately owned. This has led to public statements about the amount of undeveloped agricultural land in the forests, which proved to be untrue, because the land referred to was actually in private ownership. For years the general land laws were in operation, and at the time of the establishment of the forests large timber interests were amassing tracts of enormous size and value. About 90 per cent of the western white pine in Idaho and Montana—the most valuable tree of the Northwest—is owned by private timber companies. A considerable part of this lies within the national forests. The timber companies aimed to secure the heaviest timber. Naturally this occurs on the best soils. Moreover this private land is usually the most accessible to transportation.

PRIVATE OWNERSHIP OF TIMBERLAND RETARDS AGRICULTURAL DEVELOPMENT.—The history of homesteads in heavily timbered regions of the West has been that actual agricultural development has occurred where the entryman had as a starting point a stretch of open land such as a meadow or an area cleaned by some old fire. Heavily timbered tracts have promptly passed into the hands of timberland owners or are held by the entryman for timber speculation. The reason for this condition is obvious. The timber has an actual tangible value for speculative purposes. The entryman is able to sell out and realize a very substantial sum from a timber concern, or if he is strong enough he can himself hold the timber for the increased value which is certain to come. On the other hand, to clear the land and destroy the timber means infinite hand labor, representing a cash cost of from $75 to $250 per acre, according to the amount and conditions of the stand of timber. The inevitable result has been acquisition of most of the timber by timber companies and timber holders.

The most conspicuous example of this principle is found on the Olympic National Forest, concerning which details were given in my report for 1910. Precisely the same result has occurred in other timbered regions. A careful analysis of all timbered homesteads located in the Kaniksu Forest prior to its withdrawal, 95 in all, showed that only 1.34 per cent of the cultivable land has been put to agricultural use. A similar examination of 71 claims in the Clearwater National Forest of Idaho showed that 1.1 per cent of the claims had been cultivated.

The effect on agriculture of private ownership of timberlands is here very clearly shown. The timber owner holds the property until he is ready to cut or until the values have risen to a point which induces him to sell. The lands are then logged and the owner offers them for sale at such competitive prices as he can secure. The policy of most companies has been to go rather slowly in selling their lands. Recently public pressure has forced many companies to establish land departments to dispose of the agricultural land. The prices obtained range from $10 per acre up. In this process the settler is not helped. The land lies undeveloped until the company is ready to cut the timber. The settler then has to pay a big price for the land. The well-to-do farmer can pay this price, but the home seeker with no money even for a small cash deposit is excluded. Laws made for the benefit of this very home seeker result in excluding him altogether and permitting the timber speculator to acquire resources of enormous value from the Government for speculative purposes.

It is this condition which has led to the policy of the Forest Service to cut over the heavily timbered tracts before opening them to entry, in order that settlement may be hastened and the bona fide settler may get his land free.

WHAT LAND HAS BEEN OPENED TO ENTRY.—The Forest Service has been steadily segregating and listing for entry the lands in the national forests that are chiefly valuable for agriculture. Between the time that authority to list was granted in 1906 and June 30, 1912, there was listed a total of 1,144,359 acres to the benefit of over 12,000 settlers. In the first four months of the current fiscal year this amount has been increased by 68,665 acres more. The nearly 10,000,000 acres eliminated from the forests during the last three years also contained a great deal of agricultural land.

Where land is found suitable for dry farming it is segregated and opened to entry. If irrigation is required, land of good soil is listed wherever there is a possibility of developing water. In the case of agricultural land now covered with heavy timber far exceeding its value for farming, listing of which would invite timber speculation rather than bona fide settlement, the timber is removed by sale and the land then opened to entry. Some of the timbered lands contain from 20,000 to 75,000 feet per acre, worth from $2 to $5 a thousand on the stump.

Where land is chiefly valuable for water-power sites, irrigation reservoirs, or purposes which would lead to the monopolistic control of natural resources it has been retained under public control. Lands needed for public purposes, such as administrative sites, logging landings, mill sites, etc., have also been retained by the Government.

PROBLEM OF RIGHTS OF WAY.—The problem of reserving rights of way for public uses has presented many difficulties. A large number of tracts which are opened to agricultural entry are so located that they control the rights of way over which national forest timber must be brought to market or command the only way to private timber and to agricultural tracts. This is especially true because so much of the agricultural land in the national forests occurs in strips along narrow valleys and gulches. In many of the tracts which were first opened to entry this condition was not foreseen, and no provision was made for a reservation of a right of way. Already difficulties of this kind have arisen. The only way under the present law of meeting this situation is to survey out in advance the right of way and describe it in the patent. This is very costly and, furthermore, it is unsatisfactory, because it is often impossible to tell in advance just where the needed right of way will be required. There is, therefore, urgent need of general legislation authorizing the Secretary of the Interior to express in all patents the reservation of rights of way for governmental purposes and the need of settlers.

LAND CLASSIFICATION.—For several years after the passage of the forest homestead act examinations of agricultural lands were made only upon application; that is, when a specified tract was desired by some one who wished to take advantage of the law. While the desirability of a general classification on the initiative of the Forest Service was recognized, the urgent demands on all available funds, created by the necessity of protecting from fire the vast public resources embraced in the forests and the further necessity of providing for the transaction of business involved in their use, operated to defer the inauguration of this large new task. Furthermore, nontimbered agricultural lands in the forests are in scattered areas and can be located only through a large number of individual examinations dealing with small units. Where relatively large nontimbered areas suitable for agriculture occurred they were usually dealt with not by considering them for listing, but by eliminations through presidential proclamation. As already explained, the 10,000,000 acres so far eliminated comprised a great deal of such land. Systematic classification of the agricultural lands was begun in 1909, and a great deal of progress has already been made, particularly in northern Montana. This work was not extended to all the districts until the present year. A more comprehensive plan of work was approved by the Secretary of Agriculture in April, 1912, and plans were immediately initiated for the field season then opening. By June 30, the end of the fiscal year, the classification work was in full progress in four of the six districts—1, 2, 3, and 6. Under this plan the agricultural lands are to be classified in each forest and full data secured concerning the character of the soil and other conditions bearing on their suitability for agricultural development. In order to secure authoritative data as a basis for the classification the cooperation of the Bureau of Soils has been secured. The Bureau of Soils furnishes for the work a number of its best field experts. It was recognized that such questions as the depth and character of the soil, whether irrigation is practicable or whether crops can be raised without irrigation, whether the altitude and climatic conditions are such that crops will mature, and whether the slopes are so great that there is material danger of erosion, should be passed upon by specialists in agriculture.

The greatest obstacle to the carrying out of this work was the lack of funds which could be used without seriously curtailing or stopping other important work. This is true in spite of the fact that in the long run such a classification would be much more economical than to continue under the old plan. It would also meet the urgent demand of the settlers who wish to secure homes within the forests. A Senate amendment to the agricultural appropriation bill for the fiscal year 1913 provided an appropriation of $50,000 for the classification of agricultural lands, and thus opened the way for carrying forward the classification work more rapidly. The amount carried by this amendment was reduced in conference to $25,000. In its original wording this amendment provided for the classification of lands "suitable and fit for agriculture"; the House conferees, however, caused such a rewording of the amendment as to insure the retention of the principle embodied in the act of June 11, 1906, which prevents the opening to entry of lands having greater value for their timber or other forms of national forest use than for agriculture, and of lands needed for public purposes.

The agricultural appropriation act became a law on August 10, 1912. The work of classification, greatly enlarged, is being pushed with all possible vigor.

LANDS LISTED DURING 1912.—The results of the year under the law of June 11, 1906, are shown in the following table:

Applications and listing for forest homestead entry.

Fiscal year.	Number of applications during year.	Awaiting final action at close of year.	Number of tracts listed during year.	Acreage listed during year.
1912	5,100	3,135	2,063	215,848
1911	5,349	2,984	2,962	311,306

While there is always an accumulation at the close of the fiscal year of applications awaiting action because they were made during the winter months, when field examinations are in most regions impossible, the number of such applications shown above was unusually high for special reasons. Of the total 3,135, almost one-half, or 1,418, were pending in the office of the district forester at Missoula, Mont. Of these. 140 are within a railroad grant and can not be acted on until public survey has been extended; 125 are for what are known as "jack-pine flat" lands, of sufficiently doubtful agricultural value to justify an exhaustive investigation now under way by the Bureau of Soils; while 302 are for heavily timbered lands in several Montana valleys. The soil in these valleys is considered valuable for agriculture, but when areas applied for support very heavy and valuable timber it is necessary to suspend action until the timber can be removed if actual use for agriculture, not withholding from use for purposes of timber speculation, is to be brought about. A number of other applications have been suspended pending the general classification of the forests in which they are located.

THE SURVEY OF CLAIMS.—The preliminary survey under which land is listed for settlement under the act of June 11, 1906, is made at the expense of the Government, but when the entryman comes to make final proof he must file a plat and field notes of a survey of his claim made under direction of the surveyor general. This adds an expense of from $100 to $200 which the settler must bear, and in most cases is a duplication of work. Under a cooperative plan recently effected between the Department of the Interior and the Department of Agriculture, the original survey will be made under direction of the surveyor general by a forest officer designated by him, and the settler will be relieved from additional expense.

The act of August 10, 1912, made an appropriation of $35,000 for the survey and listing of agricultural lands by metes and bounds under the above-mentioned plan, and provided that no land listed under the act of June 11, 1906, shall pass from the forest until patent issues. This will encourage settlement by removing the obstacle of the cash outlay heretofore necessary to secure patent to the lands, and will place all settlers within the national forests on an equal basis so far as the cost of survey is concerned.

LANDS WITHDRAWN AS ADMINISTRATIVE SITES.—It is sometimes said that agricultural development of national forest lands has been unnecessarily blocked by excessive withdrawals of land for administrative use. Both proper protection of the forests and adequate provision for their business needs call for the reserving of such areas as will be needed for public purposes. These include not only headquarters for rangers, but also sites for lookout stations, forest nurseries, storehouses for tools and other fire-fighting equipment, corrals and summer pastures, logging landings, sawmill and dam sites, and many other requirements. As development of the forests progresses and their use by the public becomes intensive the number of administrative sites needed will grow greater. It was early seen that if proper facilities were to be available for the transaction of business and the stationing of forest officers where they would be required, future needs must be anticipated. Instructions were therefore issued for the selection of advantageous sites wherever it might appear that they would be wanted later.

The Department of the Interior has withdrawn, at the request of the Secretary of Agriculture, 4,208 national forest administrative sites; of this number, however, 651 were subsequently released as not needed for public purposes. Many sites have also been reserved through the posting of notices by forest officers and approval of their reservation by the district forester, but without withdrawal by the Department of the Interior. A large number of these sites have upon them improvements in the form of ranger cabins, barns, corrals, fences, lookout towers, signal stations, nursery and planting stations, etc. Many of these sites cover less than 25 acres each. A large part of them are located where agriculture is impossible.

During the year 31 sites were withdrawn from unreserved public lands by Executive order. There were 167 recommended for release. The total number held either through such reservation or through withdrawals was, at the close of the year, 6,027 administrative sites of all classes.

The ranger stations now provided for by site reservations will furnish in the neighborhood of one station to every 60,000 acres. In the heavily timbered districts there should be during the dry season, if the forests are to be well protected, at least one patrolman to every 10,000 acres. Far from being excessive, the number of stations now reserved makes but indifferent provision for the needs of more than the next few years. Successful protection of the forests requires not only an adequate force but a well-placed force. Many forest fires are promptly extinguished each year which would do great damage if ranger stations were not fairly near at hand. The matter is of importance in the same way that properly distributed engine houses are of importance in the control of city fires.

Since ranger stations must be placed where forest officers can either actually live with their families throughout the greater part of the year or make headquarters during the summer months, with sufficient feed for their saddle and pack horses, it is necessary to select for this class of sites areas which furnish a fair amount of arable land or pasture. That this has been felt as a hardship is strong evidence of the nonagricultural character of the forest lands as a whole. The Government must obviously provide for its own needs; but it does not displace settlers already in possession or reject applications for the listing of land in order to take the land for public purposes. Instructions which have been in force since April 19, 1909, forbid the reservation as administrative sites of any tract application for which as a forest homestead is pending.

COST AND RECEIPTS.

The following tables show the gross cost of administration and protection, expenditures for permanent improvements, and receipts from the several sources, both in totals and per acre, during the year, as compared with those for the fiscal year 1911. The per-acre expenditures and receipts are computed on the basis of the gross area of all national forests under administration at the close of the year, since the cost of administration is not materially lowered by private holdings within the forests.

Expenditures for administration and protection and permanent improvements during the fiscal year 1912, compared with 1911.

Fiscal year.	Administration and protection.		Permanent improvements.	
	Total.	Per acre.	Total.	Per acre.
1912	$1,718,668.96	$0.02518	$499,158.55	$0.00266
1911	5,335,886.97	.02766	273,634.42	.00142

Comparison of receipts from the several sources for fiscal years 1912 and 1911.

Fiscal year.	Timber.		Grazing.		Special uses.		All sources.	
	Total.	Per acre.	Total.	Per acre.	Total.	Per acre.	Total.	Per acre.
1912	$1,089,702.04	$0.00581	$968,842.26	$0.00517	$98,812.27	$0.00053	$2,157,356.57	$0.01151
1911	1,014,769.84	.00526	935,490.38	.00491	76,645.93	.00040	2,026,906.15	.01065

Refunds of excess deposits (as, for example, deposits made by buyers of timber in advance of cutting) have not been deducted from the receipts given above. The refunds of timber receipts in 1912 amounted to $39,731.02, and of all receipts to $48,099.66. A deduction of the refunds would leave the total of receipts for 1912 $2,109,256.91, as against $1,968,993.42 for 1911. These figures show an increase in total receipts of $140,263.49. The increase in receipts from timber, after deducting refunds, was $83,377.61; from grazing, $33,521.99; and from special uses, $23,363.89.

FOREST MANAGEMENT.

TIMBER RESOURCES OF THE NATIONAL FORESTS.

The total stand of timber on the national forests, including Alaska, is now estimated at the equivalent of 597,478,000,000 feet, board measure. Of this amount slightly more than 23,000,000,000 is in protection forest on the upper parts of watersheds, where no cutting can be done. Approximately 348,000,000,000 feet is mature and overmature. Accurate determination of the annual yield is not yet possible, but it may be put at about 6,150,000,000 feet. The annual requirements of the localities in the vicinity of the national forests may be roughly estimated at 305,000,000 feet under sales and

137,000,000 feet under free use. On the basis of the annual yield this would leave available for sales to supply the general market approximately 5,700,000,000 feet.

BROAD FEATURES OF MANAGEMENT.

The work of obtaining a detailed inventory of national forest timber was continued. Areas upon which sales are pending were given first consideration. The work was carried on to a smaller extent on other areas. Its purpose is to enable a more intelligent location of sales and to furnish a more exact basis for efficient management. Expenditures in timber reconnoissance are restricted because of the greater importance and the immediate urgency of protection from fire and the classification and segregation of agricultural lands. Intensive reconnoissance covered, however, during the year approximately 5,250,000 acres at an average cost of slightly more than 3 cents per acre. This makes a total area covered intensively of approximately 12,850,000 acres. In addition, approximately 8,890,000 acres were covered by extensive methods, bringing the total covered by extensive reconnoissance to about 32,000,000 acres.

The completion of the stock taking upon individual forests makes possible the preparation of forest plans, the object of which is to systematize and control the management of each forest upon a definite basis which shall represent the cumulative experience and information applicable to the specific task. Furthermore, detailed estimates of the standing timber and studies of logging conditions and costs are necessary before sales can be made. The increase in the volume of timber sales must be accompanied by greater expenditures for this essential preliminary work.

Because of the wide diversity not only in the resources of the forests, but also in the demands for their use, it has been necessary with the limited funds available to provide (1) for preliminary plans, covering forests where only approximate data are now needed, and consisting simply of a systematic statement of the resources of the forests, the conditions governing their use and development, and the administrative measures to be followed in their management; and (2) for working plans, prepared only where the demand for the forest resources as compared with the supply is relatively great. Working plans are more complete and final in character, and are based upon more thorough investigations and more accurate data. They include: A statement of the timber resources, and specific provisions for management; a similar statement of the range resources with an outline of management methods to be followed; provisions for the classification and segregation of agricultural lands and for the reservation of lands needed for administrative and public purposes; provision for the administration of miscellaneous forest uses, including water power, with as complete a statement of resources under each as is possible and desirable; the most intensive and detailed provision possible for protection of the forest from fire, based upon a statement of the value and distribution of destructible resources and the hazard or risk by regions within the forest and the methods of control actually necessary for efficient protection; provision against insect infestation or other damaging agencies which may threaten; a comprehensive outline of the improvements needed on the forest so far as they can be foreseen, with an indication of the approximate order in which they should be taken up; and finally, a complete summary of the administrative force needed to conduct all lines of work economically and efficiently, together with the estimated cost of these lines of work and their proper correlation. In short, they cover every phase of forest administration. Working plans outline the general scheme of management in a broad way for a long period, and in considerable detail for some such period as 10 to 15 years.

The collection of the detailed data for working plans is carried on under the immediate direction of the supervisors, with inspection and supervision from the district offices and Washington. Completed plans are finally reviewed by the assistant foresters in charge of each branch, and approved by the Forester.

Preliminary plans are being prepared as rapidly as practicable for all forests except those on which working plans are needed. Working plans are now in preparation for the following forests: The Kaniksu, where the demand for western white pine has become very great, and sales are desirable to permit the listing of agricultural lands; the Deerlodge, on which there is a very extensive demand for timber to supply the Butte mines; the Crook, where approximately the total production of the forest is and will be needed to supply the needs of settlers in and near the forest; the Coconino and Tusayan, where there has been for a number of years an extensive demand for yellow-pine timber for the general market; the Gila, where a strong demand has existed for fuel wood to supply the mines at Mogollon; the Plumas, from which it will be possible to dispose of a large part of the annual production to supply the general market; the Medicine Bow, with a large amount of material suitable for railroad ties, which in the future are practically certain to be in great demand for railroad maintenance and extension; and the Florida, where an active naval stores industry is ready to utilize the entire turpentine yield of the forest that can be made available.

The regulation of yield in the intensively managed forests of Europe is one of the most important phases of administration. The importance of regulation within the national forests will increase in exactly the proportion that their use becomes intensive. Another step toward intensive management was taken during the year by the determination within all of the districts of regulation units or divisions based upon topography, transportation facilities, and the logical markets, either local or general, which should be supplied from each area. The division boundaries are independent of existing forest boundaries. Usually the authorized annual cut for each division will not exceed the annual production by growth. Where, however, a large part of the total merchantable stand is mature and overmature, a cut in excess of the annual yield is justified both to prevent waste and to put the forest in a condition in which the production of wood will be far more rapid. Based upon the estimated annual growth and the amount of mature and overmature timber, the total cut authorized from all divisions for the fiscal year 1913 is 6,327,232,000 board feet, including 176,685,000 feet for free use.

The Forest Service has in the past cooperated with the Bureau of Entomology in order to protect the forests from insect ravages. Because of the necessity for correlating insect control with such work as cruising, the marking of timber for cutting, and brush disposal the service has, with the consent of the Bureau of Entomology, taken over the routine field work. Cooperation is to be continued in the control of special outbreaks for which proper methods are not yet known and along investigative lines in order to develop and improve existing methods of control. A trained force of forest officers for this work will be developed as needed. It has already been necessary to assign one man each to districts 1, 5, and 6.

THE TIMBER SALE POLICY.

The national forests contain nearly 600,000,000,000 feet of merchantable timber. Nearly 350,000,000,000 feet is ripe for the ax and deteriorating in value, rapidly on areas swept by fire, gradually on areas where the forest is mature and the trees are slowly yielding to decay. Standing timber, unlike coal deposits, can not be held in storage indefinitely. To the extent to which the overripe timber on the national forests can not be cut and used while merchantable, public property is wasted. It has already been pointed out that the annual growth of wood on the national forests is equivalent to over 6,000,000,000 feet of lumber. This much can be cut every year for all time without depleting the supply. To utilize the rapidly deteriorating material and to aid in making the forests self-supporting the actual cut will be increased to approximately 3,000,000,000 feet annually as soon as possible. The conservativeness of this policy is evident when it is considered that there will be cut each year but 50 per cent of the annual growth on the forests, and less than 1 per cent of their total stand of mature timber. Notwithstanding the increased cut contemplated, this policy will reserve large amounts of timber for use during the period when the effects of the timber shortage are beginning to be felt.

To put the national forests to use their ripe timber must be sold under conditions practicable for the lumbering operator. Under the policy in effect until last year of refusing to dispose of more than approximately 100,000,000 feet in one sale or to allow a period for cutting of more than five years, the annual sales of timber have always been less than 1,000,000,000 feet. A large percentage of the mature national forest timber is comparatively inaccessible, and, although it occurs in large bodies, heavy investments are required for the development of the transportation facilities necessary for its removal. In two particular cases this investment was estimated at more than $1,500,000. A change in policy to permit the sale of larger amounts of timber with longer periods for cutting was mentioned in last year's report. This change has been well received by purchasers and has increased the demand for timber. Instead of an arbitrary limit the amount which will be included in any sale is now determined by the actual physical conditions met in logging and the amount of capital which must be invested. Enough timber is included in each sale to justify reasonable men in making the investment necessary for its exploitation. The investment required is estimated by forest officers. More than sufficient timber to justify the outlay which the physical factors necessitate is not sold.

In these large sales a contract period sufficiently long to cut the timber under a continuous operation, considering the physical factors of the situation and the amount that the tributary markets will absorb, is allowed. When this period exceeds five years, provision is made for a readjustment of stumpage prices at the end of each three, four, or five year interval. Provision is also made for changes in the contract requirements which will insure utilization, methods of logging, and silvicultural practice fully up to the best standards developed in the region at the time of each periodic readjustment of prices. The original stumpage appraisal is based upon a close estimate of the cost of manufacture and the market price of the product. It permits a fair operating profit to the purchaser on his actual investment in the business, but no more. It is, as nearly as the experts of the service can determine, the full market value of the timber where it stands. As a further insurance of full value to the Government in larger sales, the period of advertisement of at least 30 days required by law is increased to from 2 to 6 months. The period of advertisement in all cases gives full opportunity to any interested persons to make field examinations of the timber. All possible further publicity which will tend to increase interest and competition is sought. The plan of price readjustment most commonly used in the negotiations of the last year was one based upon a comparison of the average mill-run lumber prices during a specified period immediately preceding the date of readjustment with the prices existing at the date of the original appraisal. The Forester, in his discretion, may increase the stumpage price by such an amount as he may deem equitable, up to 75 per cent of the increase in lumber values. The operator is justly entitled to a portion of the increase in the market value of his product, to offset increases in the cost of production and other inherent contingencies.

In sales of large amounts of timber with long cutting periods special precautions are necessary to prevent speculative purchases and the monopoly of timber holdings. The readjustment of stumpage prices largely precludes speculative profits. Other safeguards against speculative purchases are provided by requiring a fixed minimum cut during specified periods which vary from one to five years, but in the larger sales are usually from three to five years; by making sales only to bona fide operators who are financially able to complete them; and by refusing to allow the assignment of contracts. Monopoly is prevented by (1) advertisement and publicity; (2) requiring that railroads and other transportation facilities constructed shall be available under reasonable terms for the use of other purchasers of national forest products, either by becoming common carriers or otherwise; (3) the use of administrative discretion in the approval of bids. When any question of monopoly through the possible control of large quantities of timber by affiliated operators arises, a certified statement of the relation of the applicant or bidder to other purchasers of national forest timber may be required. A certified statement of the membership of firms or lists of stockholders in corporations may similarly be required. Lumber companies already holding large amounts of timber on private lands may be refused sales if there are any other purchasers, and companies having one sale may be refused others until the first has been cut. Further safeguards against monopoly are found in that practically without exception the construction of railroads or other transportation facilities in connection with each sale will result in making additional timber available, and that even the largest sales, which may extend through a maximum period of 10 to 20 years, cover but a small fraction of 1 per cent of the merchantable timber on the forests.

Large sales are made only where they furnish the sole means of utilizing inaccessible timber. The experience of seven years has shown that much timber can be disposed of in no other way. The refusal to make such sales would result in great loss of timber, which is already deteriorating. Each sale made under such conditions not only prevents waste, but makes productive an area where now growth is offset by decay. The construction of transportation facilities in connection with every large sale develops and increases the value of other bodies of timber. In a recent case in California the increase in the value of timber not sold was estimated to be considerably more than the purchase price of the timber placed under contract. With the use of a railroad or other improvements granted to subsequent purchasers, the public will secure greater returns from adjacent bodies than it could ever have obtained had the first sale not been made. Finally, every sale of this character opens to general development a region previously locked up; it makes possible new mining operations, aids agricultural development by affording an outlet for crops, creates local business, and draws in population.

The annual yield, or amount of timber produced annually upon any area, must be the ultimate basis of the cut. It is absolutely necessary that provision be first made on each market unit for meeting local needs. Enough timber for such needs, if it is available, is reserved. The following examples illustrate the application of this policy:

Upon the Deerlodge National Forest, in Montana, the annual yield is estimated to be 40,000,000 board feet, all of which is needed to supply the mines at Butte. From this forest no sales to supply any outside markets will be considered. Upon the Holy Cross National Forest, in Colorado, the annual yield is estimated to be 6,000,000 feet, and since it is believed that local markets will require all or practically all of this amount, sales for the general market are not made. The limitation of cut on the Sioux Forest is 4,650,000 feet. Experience has shown that approximately 4,150,000 feet annually, practically all of the timber which can be cut, will be used locally.

On many forests, however, the excess of production over the amount needed for local consumption is very great. On the Cascade National Forest, in Oregon, the annual production is estimated to be 200,000,000 feet, while present local needs can be supplied by approximately 1,000,000 feet. Local consumption on the Sierra National Forest is less than 700,000 feet annually, while the cut allowed is 260,000,000 feet. From such forests a large cut for the general market can safely be permitted.

A cut in excess of the yield will be authorized in a few divisions or forests which have a large amount of mature and overmature timber and a strong demand, and on which restrictions to provide for a sustained local supply are not needed. Until transportation and market facilities are more evenly distributed, demand must enter largely into the determination of where sales shall be made.

So far as possible, data for timber sales are gathered in advance of application, with a view to interesting prospective purchasers and in order that sales may be made where cutting is most desirable. An office has been established in Chicago, from which information is furnished eastern lumbermen. This has resulted in numerous inquiries and several field examinations of timber which should be cut. Circulars have been prepared describing such bodies of timber and are mailed or presented to persons who might be interested.

THE TIMBER-SALE BUSINESS OF THE YEAR.

The timber-sale business of the year is shown by the following statement of the amounts and value of timber sold and timber cut under sales by States:

Timber sold and cut under sales on the national forests, fiscal year 1912.

State.	Timber sold.		Timber cut under sales.	
	Amount.	Value.	Amount.	Value.
	Board feet.		*Board feet.*	
Arizona	18,177,000	$35,467.45	47,433,000	$136,354.22
Arkansas	15,309,000	38,078.40	9,130,000	21,336.54
California	109,214,000	232,697.81	43,914,000	97,239.33
Colorado	77,745,000	149,271.60	43,484,000	85,662.38
Florida	70,000	78.00	35,000	33.59
Idaho	207,389,000	345,429.32	65,656,000	141,115.25
Kansas	----------	----------	----------	----------
Michigan	4,000	14.29	4,000	14.29
Minnesota	658,000	2,970.70	617,000	2,873.87
Montana	110,637,000	228,723.33	55,911,000	141,691.14
Nebraska	----------	----------	----------	----------
Nevada	2,976,000	8,928.34	2,030,000	5,241.17
New Mexico	26,973,000	75,050.49	17,612,000	40,187.05
North Dakota	----------	1.20	2,000	2.40
Oklahoma	33,000	95.50	33,000	95.50
Oregon	150,985,000	349,283.50	29,337,000	59,965.30
South Dakota	12,375,000	32,363.33	9,660,000	23,931.02
Utah	13,415,000	31,297.37	11,487,000	27,638.54
Washington	10,939,000	21,216.61	37,532,000	74,797.06
Wyoming	3,593,000	5,902.56	12,967,000	33,736.12
Alaska	38,924,000	43,903.75	44,648,000	50,904.44
Total, 1912	799,416,000	1,600,773.55	431,492,000	942,819.21
Total, 1911	830,304,000	2,122,539.05	374,678,000	842,992.89

The total value of the timber cut under sales as given above differs from the receipts from timber as reported on page 496, both because the latter includes the receipts from timber and fire trespass and because timber is paid for in advance of cutting, with the result that the payments made during any year and the cut of that year under sales do not precisely correspond.

The amount of timber sold was 30,000,000 feet less than in 1911, but the cut increased nearly 60,000,000 feet, and the receipts from sales were $100,000 greater.

In district 1, including Montana and northern Idaho, efforts were concentrated upon disposal of the timber killed by the fires of 1910. Detailed examinations show only approximately 3,225,000,000 feet killed, a material reduction from the early estimates. Of this, nearly 900,000,000 feet of merchantable timber is reasonably accessible under present conditions. Slightly more than 400,000,000 feet has been sold, and applications are pending for about 180,000,000 feet more. Rapid deterioration makes further sales improbable.

The selling of much of the fire-killed timber was complicated by the intermixture of Government and unperfected private holdings. To operate, purchasers required solid blocks; on lands of unperfected title, however, the Government could neither sell nor allow the claimant to sell without some provision against loss should the lands never pass to the claimant. The main difficulty arose in connection with the unclassified or unsurveyed Northern Pacific lands. An opinion from the Attorney General, however, made it possible to allow the cutting of the timber from unperfected private holdings after the filing of a bond sufficient to protect the interests of the United States. Working under this opinion a cooperative agreement was drafted with the Northern Pacific Railroad whereby the company agreed to dispose of its timber and to bear its proportionate share of the expense of scaling, running of lines, and general supervision. The same general plan was followed in the case of timber on unperfected homesteads.

There is an active demand for the white pine and other timber on the Kaniksu National Forest in this district, and the sale of 450,000,000 feet to several local operators during the coming winter is under consideration. These sales are particularly desirable, since they will make possible the opening of from 12,000 to 15,000 acres of agricultural land, now heavily timbered, to settlement. Tentative applications for large tracts in northern Montana for the manufacture of paper pulp have also been received.

District 1 is the only district showing increased sales during the year. The cut has showed little change. In district 2, including South Dakota, Colorado, and much of Wyoming, both sales and cut fell off. This was due largely to the retrenchment policy of the transcontinental railroads, which have in the past bought for ties much of the timber sold, especially in Wyoming. Other sales for local consumption in district 2, on the whole, fluctuated little from preceding years. An increase in the total sales business of this district over that of preceding years may be expected as soon as new contracts for ties are made by the railroad companies. It is anticipated that this will take place in the near future.

In district 3, including Arkansas, Arizona, New Mexico, and Florida, receipts increased. In Arkansas increasing sales and demand emphasize the importance of securing better utilization in the manufacture of cooperage stock, which takes a high grade of material and wastes much timber of value for the manufacture of lumber and other products. Investigations are now being made to determine the percentage of loss in stave manufacture as compared with ordinary logging.

Tentative applications have been received in Arizona for sales to supply the mining markets in the southern part of the State, which heretofore have secured their material from the Pacific coast, an obvious economic loss when timber within a few miles is available. Pending sales for this market and for the general yellow-pine lumber trade involve a total of more than 500,000,000 board feet.

In district 4, which includes Utah, southern Idaho, and western Wyoming, practically all the timber sales of the year were small, to supply local needs. The cut was substantially the same as in 1911. Large sales and even many small sales were prevented by the competition of Pacific coast and eastern Oregon mills, which undersell local operators. One result of the general depression in the Pacific coast lumber industry which has characterized the past three years, and which apparently reached its lowest level in 1912, has been the supply of the markets of district 4 with imported lumber at practically cost prices. The large local market in Utah and southern Idaho, however, has led to tentative applications for tracts in the Boise and Payette forests, and the sale of at least 300,000,000 feet in this region within the next year is anticipated.

In district 5, covering California, the receipts from timber sales increased. Actual sales fell off slightly, but a marked increase took place in demand, particularly for remote bodies of sugar and yellow-pine timber under long-term contracts. This is an accompaniment of the general activity in the lumber industry of California due to the anticipated completion of the Panama Canal and building preparatory to the Panama Exposition. Under the large-sales policy, contracts were entered into disposing of 90,000,000 feet on the Tahoe and 183,000,000 feet on the Shasta. Negotiations are in progress for a sale of 800,000,000 feet on the Sierra. In addition, sales are under consideration on the Klamath, Sierra, California, Lassen, and Tahoe forests aggregating over 2,000,000,000 feet.

Sales in district 6 (Washington, Oregon, and Alaska) were mainly in the yellow-pine belt in southern and eastern Oregon. Receipts showed a substantial increase. Cutting began on two new sales on the Whitman, one of 57,000,000, the other of 74,000,000 feet, and negotiations in a third sale of 60,000,000 feet were practically completed. Other areas aggregating 100,000,000 feet are in demand on this forest and will probably be placed under contract during the next six months. A very active demand for western hemlock and Sitka spruce for wharf and track piling developed on the Tongass Forest in Alaska. The depression in the Douglas fir belt on the coast still continues. During the latter half of the year, however, lumber prices advanced, and this was reflected in renewed sale applications, in some cases for large amounts. The policy regarding large sales is particularly adapted to the conditions in the forests of the Northwest and played its part in the renewed interest in national forest timber.

In all but two of the national forest districts, therefore, conditions improved during the year. The total cut rose from 374,678,000 feet to 431,492,000 feet, and receipts from $842,992.89 to $942,819.21. Sales fell slightly below those of 1911. The new policy covering large sales was in effect long enough to complete only two sales. The time required for the detailed examination of the large areas applied for, for the careful consideration of all terms of the contracts, and for the long advertisements necessary to promote competition have made it impossible to consummate most of the larger sales, on which an immense amount of work has been done during the year. Consummation in 1913 of even a few of the large sales now under consideration and already enumerated will bring a greatly increased total for that year. While it is not to be assumed that all these applications will result in sales, they are, in the aggregate, a strong indication of a materially improved market. There are more of them than ever before at any one time, they are for much larger amounts, and for a number of them negotiations appear to be nearing completion. The increased activity in the lumber market also presages a much larger volume of sales business than ever before.

The sales in 1912 of nearly 800,000,000 feet, or almost twice the actual cut, following the sale in 1911 of 830,000,000 feet, gives every indication of a substantial increase in the 1913 receipts. This may the more confidently be predicted since the receipts for the first three months of the year 1913 exceed those for the same period of the year 1912 by approximately $80,000. The average price received for timber sold during the year was $2, as against $2.56 for the year 1911. The decrease was due chiefly if not wholly to the large amount of fire-killed timber sold at low rates.

The following classification according to the size of sales shows that out of a total of 5,772 sales, 5,727 were for amounts less than $5,000, and that 5,179 were for amounts under $100. Through small sales the Forest Service supplies the needs of the people living in and near the forests and furnishes business opportunities to the small operator. It is the aim to give all possible encouragement to such sales, which in the long run should form the mainstay of the national forest timber business. The new policy with regard to large sales by no means substitutes such sales for those made to supply the small mill, but opens up new territory which the small operator will be able to enter later on.

Number of timber sales, fiscal year 1912, classified according to amount of sale.

State.	Under $100.	$100 to $500.	$500 to $1,000.	$1,000 to $5,000.	Over $5,000.	Total number of sales.
Arizona	507	27	3	1	1	539
Arkansas	28	10	2	7	2	49
California	575	37	9	12	2	635
Colorado	674	30	14	19	6	743
Florida	6	------	------	------	------	6
Idaho	463	60	8	7	8	546
Kansas	------	------	------	------	------	------
Michigan	3	------	------	------	------	3
Minnesota	2	1	1	1	------	5
Montana	1,131	95	20	25	7	1,278
Nebraska	------	------	------	------	------	------
Nevada	261	8	------	1	------	270
New Mexico	287	16	3	3	4	313
North Dakota	1	------	------	------	------	1
Oklahoma	33	------	------	------	------	33
Oregon	198	6	3	5	9	221
South Dakota	149	1	------	1	2	153
Utah	364	20	4	6	1	395
Washington	67	7	4	------	2	80
Wyoming	133	11	3	------	------	147
Alaska	297	49	4	4	1	355
Total, 1912	5,179	378	78	92	45	5,772
Total, 1911	5,144	327	70	73	39	5,653

SALES OF TURPENTINE.

The application of forest management on the Florida National Forest includes provision for turpentining. The old method of boxing was very destructive of timber, and some years ago the Forest Service introduced conservative methods which reduce such loss to a minimum. When the Florida National Forest was placed under administration, naval stores operators hesitated to adopt the conservative methods required by the Government, and few turpentine leases were made during the first year. Contrary to the expectations of the operators, however, conservative regulation has increased the yields. Although regulation during the past year was more strict than ever before, demand for turpentine contracts greatly increased. In all, turpentine leases on the Florida National Forest in 1912 yielded $16,658.47, as compared with $8,268.68 in 1911. Prices during the first year averaged only $50 per thousand cups; last year they averaged $100 per thousand cups, with a maximum of $118. It is almost certain that, if it were consistent with good management, all the timber within the forest could be placed under turpentine contracts in a short time without difficulty. The conservative methods employed greatly prolong the period of turpentine production. Estimates place this at from 15 to 20 years. The forest is under a plan of management which groups turpentine permits on areas where timber sales may easily be made after the turpentining is over. Management by groups of permits has been found to result in better competition and better fire protection. While utilization of the timber for naval stores puts off the time when it can be sold and cut, turpentining must be considered a very important phase in the utilization of the trees.

The great demand for naval stores products, together with the rapidly diminishing supply of timber in the Southeast, has made it necessary for operators to seek new fields. Successful experiments conducted by the Forest Service in turpentining western yellow pine in the Southwest and in California have aroused interest among operators. Experimental sales are planned in Arizona and California.

TIMBER TRESPASS.

The receipts for timber cut in trespass were $40,290.68, as against $43,236.37 in 1911. At the beginning of the year there were 189 timber trespass cases pending, and 172 new trespasses were reported during the year. Fifteen cases were reported to the Department of Justice for prosecution, 114 settled by the trespasser upon request, and 67 dismissed for want of sufficient evidence or for other reasons; thus 165 were pending at the close of the year.

STUDY OF BUSINESS ASPECTS OF TIMBER SALES.

With the increase in the size of sales considered and the necessity for greater care in original stumpage appraisals, much attention has been given to two lines of study which should prove of the utmost practical value. The first consisted in the standardization of methods of determining reasonable profit for operators and appraising stumpage after detailed logging and manufacturing costs have been obtained. The second provided for the beginning of an intensive study into logging and manufacturing costs, with the idea of standardizing such costs by regions for different classes of operations. In addition, fundamental principles upon which to base the selection and application of the various methods of logging will be sought. A successful completion of this study should be of great benefit to lumbermen, as well as to forest engineers. It should also make possible the securing of data in sales so nearly accurate that appraisals by forest officers will be accepted with confidence by lumbermen and timber purchasers.

FREE USE.

The following table summarizes the free use of timber on the national forests for the year:

Free use of timber on national forests, fiscal year 1912.

State.	Number of permits.	Quantity.	Value.	State.	Number of permits.	Quantity.	Value.
		Board ft.				*Board ft.*	
Arizona	1,796	5,025,000	$10,752.12	New Mexico	4,452	12,836,000	$18,844.16
Arkansas	144	521,000	1,088.35	North Dakota	146	41,000	47.50
California	2,756	8,490,000	14,797.95	Oklahoma	454	199,000	427.70
Colorado	3,877	11,621,000	18,619.35	Oregon	2,898	13,176,000	19,839.90
Florida	4	4,000	17.10	South Dakota	1,292	5,689,000	5,512.20
Idaho	5,775	19,841,000	29,586.34	Utah	5,938	15,099,000	19,948.28
Kansas				Washington	487	2,073,000	4,158.73
Michigan	6	32,000	30.00	Wyoming	1,706	6,722,000	7,876.21
Minnesota	20	120,000	362.00	Alaska	[1]	395,000	397.75
Montana	6,118	18,289,000	38,025.01				
Nebraska				Total, 1912	38,749	123,233,000	196,335.41
Nevada	880	3,060,000	6,004.79	Total, 1911	40,660	123,488,000	196,930.24

[1] Under Reg. 3-27 timber is taken in Alaska without permit. The figures for quantity and value in Alaska are estimates only.

Of the total amount, 33,379,000 board feet was live timber and 89,854,000 dead, valued, respectively, at $88,496.96 and $107,838.45. There was practically no change in the amount and value of the material taken during the year, but the number of permits decreased slightly. A particular effort has been made to decrease the cost of administration without lessening the protection given to the forest, through the development of more simple and economical methods. Some of these are: The concentration of use on specific areas convenient to users; issuing permits for an entire or a considerable part of the fiscal year; mailing at the beginning of the fiscal year, to residents entitled to free use, year-long permits for timber on specified free-use areas; and encouraging applications from those entitled to the privilege so far as practicable during the season in which other work is slack.

LOSSES BY FOREST FIRES.

THE FIRES OF 1911 ON NATIONAL FORESTS.—The statistics of fire losses are compiled by calendar years, since the season of greatest hazard, during the warm or dry months, is included within two fiscal years. The climatic conditions during 1911 were generally favorable to fire protection, and the service was better prepared than ever before to discover, report, and extinguish fires.

The total area of national forest lands burned over was 469,638 acres, of which 348,783 acres were timberland and 120,855 acres open. The loss in timber destroyed or damaged was 117,174,000 board feet, with an estimated value of $172,385. There was also a loss in reproduction estimated at $176,406, and of forage valued at $5,955, making a total national forest loss of $354,746.

On private lands within the forests 310,342 acres were burned over, of which 267,107 acres was timber and 43,235 acres open. The loss in timber amounted to 27,019,000 board feet, valued at $37,376. The total cost of fighting the fires upon national forests and fires which threatened national forest land was $202,046.36. This does not include time spent by regular forest officers.

The timbered area burned over per 1,000 acres was 1.78 acres in 1911, as against 1.86 in 1909, and 19.90 acres in the disastrous 1910 fire season.

The number of fires during the season of 1911 and their causes are set forth in the following table:

	Number.	Per cent.
Number of fires:		
Class A (no damage)	1,571	46.63
Class B (under 5 acres burned)	583	17.31
Class C (5 acres or over)	1,215	36.06
Total number of fires	3,369	100.00
Causes of fires:		
Lightning	948	28.14
Campers	574	17.04
Railroad locomotives	442	13.12
Incendiary	225	6.68
Brush burning	199	5.90
Sawmills and donkey engines	33	.99
Unknown	743	22.05
Miscellaneous	205	6.08
Total	3,369	100.00

A special study of lightning in relation to forest fires was completed and published. This summarized 76,301 cases of trees struck by lightning on the national forests, together with many thousands of cases in the Eastern States. Lightning will always remain an unpreventable cause of forest fires, and must therefore always be considered in the protective scheme on the national forests. The records for the years 1907 to 1911, inclusive, show that 17.5 per cent of all forest fires on national forests were caused by lightning.

The table shows that 6.68 per cent of the fires were incendiary. This is a slight increase over the number for the previous year. The means for determining whether a fire is incendiary are better than formerly, and some fires were doubtless classed as incendiary in 1911 that would have been counted of unknown cause in 1910.

There are various ways of determining whether a fire is incendiary. Usually a number of fires are started at the same time in one locality. If there is no electric storm or other reason for such a series of fires, the assumption is safe that it is due to incendiarism. In a number of instances the observer at the lookout station has seen such a series starting along a road or trail at just about the time interval required to walk between the points. In several instances tracks between the starting points of a series of fires have indicated an incendiary origin. Once a half-burned candle under a stump at the point where a fire started showed the cause. In another case an ingenious contrivance with a burning glass, a veritable infernal machine, was found. It is very difficult to catch the incendiary in the act on account of the small force at the disposal of the service. Several men have, however, been apprehended and their cases are now before the courts.

It is probable that incendarism is on the decrease except in a few localities. The educational work done by the service in showing the damage by fires, the friendly feeling toward the organization and local personnel, and the vigilance of the fire patrol have worked together to reduce the number of fires from this source. During 1912 a large number of the incendiary fires occurred in northern California. These were primarly due not to ill feeling, but to the theory of light burning which is being preached by certain influential men of that State.

This theory is that, to protect the forest, fires should run over the ground every year, thus keeping down brush and getting rid of inflammable material. The object is to keep the woods open and thus prevent large fires. It was the custom of the Indians and early settlers to do this. The result has been a fearful devastation. This is particularly true in California, which actually has 30 to 50 billion feet less timber standing to-day than would have been the case had it not been for this practice. A continuance of it in the manner proposed will absolutely prevent a regrowth of forest on the old burns and would finally wipe out the forest altogether by putting a stop to reproduction.

One large timberman is carrying out the theory systematically and with great care on his own lands. He is spending about 50 cents an acre on the work and thereby is able to keep the damage down to a minimum, although a certain loss to small trees ensues. But the ordinary man simply sets the woods on fire when fire will run, regardless of this loss. The doctrine of light burning as popularly understood in California is nothing less than the advocacy of forest destruction, and those who preach the doctrine have a large share of responsibility for fires which their influence has caused.

Conditions in the calendar year 1912.—At the time of writing this report the fire season is not closed and the data are incomplete. Preliminary reports on about 1,500 fires show that the season has been favorable to fire protection, excepting on the Colorado Plateau, where an unusual number of fires were started by lightning. In fact, it would appear from these incomplete figures that the season of 1912 will show a greater percentage of fires caused by lightning than any previous year in the history of the Forest Service. In some localities more than half the fires were thus caused.

Progress in protection.—In spite of the fact that so many of the fires occurred in regions of inaccessibility, the efficiency of the Forest Service fire-protective machinery shows as rapid progress toward perfection as can be obtained with the comparatively small force of patrolmen and lookouts who can be employed with the funds available.

In the classification on page 500 it has been the custom to assume 5 acres as the area which may be burned before a fire does any serious damage. Probably 10 acres would be a fairer basis of classification, since a fire of this size is either a ground or surface fire and has not become a general conflagration consuming the crowns of the trees or merchantable timber. The computation for 1911 is, however, based upon the 5-acre limit for class B fires and shows that 63.94 per cent of all the fires on national forests were extinguished by forest officers before this limit had been passed.

As shown under the section of this report dealing with permanent improvements, the mileage of trails and telephone lines was largely increased during the fiscal year 1912, and a considerable number of lookout stations were established and equipped. These improvements directly increase the efficiency of fire protection and fire suppression.

Special attention was given to the equipment of lookout stations, since it is obviously of the utmost importance that the location of a fire be reported and the fire reached at the earliest possible moment. These stations are equipped with specially prepared protractors and with alidades, and as rapidly as possible are being supplied with suitable maps. The protractors and maps are oriented, and as soon as smoke is discovered its direction is determined with an alidade, and its exact location is found by the intersection of sights from two or more stations. If the condition of the atmosphere is favorable the sight from one station is usually sufficient, since the man on duty is familiar enough with the country within range to describe the exact location of the fire.

Feld glasses and high-power prism binoculars are used at many of the stations. Experiments are being made to determine if the installation of special equipment will increase the efficiency of some of the higher and more important stations, and it is probable that in many locations special instruments, especially telescopes, will result in a saving of time in giving the alarm.

The locating of fires by triangulation methods has proved very successful. Obviously, however, this plan can not be used except in those forests having more than one lookout point connected by telephone. As rapidly as possible the lookout points have been put in telephone communication and this work is being vigorously extended. In the Arkansas and Ozark National Forests, for instance, where, largely because of topographic conditions, the need of a lookout patrol system received early recognition, approximately 75 per cent of the area of forest land is covered by a system of lookout towers connected by telephone. It was found necessary to construct towers on the lookout points in order to obtain a clear vision, and 30-foot wooden towers or 60-foot steel towers built on the style of a windmill have proved very effective.

At some of the lookout stations heliographs have been found useful for sending alarms of forest fires. The number in use is increasing, since experiments show them to be part of the necessary equipment of some stations where telephone connection is not yet established. For instance, the Okanogan National Forest, in Washington, has been equipped with heliograph outfits and reports from their use on this forest seem to show that they will be of great benefit.

The practical results of the lookout stations have been remarkable. In many cases fires have been definitely located at distances varying from 10 to 50 miles and word has been telephoned to the nearest rangers, who have promptly extinguished them. Lookout stations are of great value in the case of lightning fires. Sometimes as many as 12 fires are started by a single electric storm. The observer at the lookout station locates all of them and is able to direct the rangers just where each fire is, so that he can assemble the necessary force and equipment to put them out. Many instances have occurred where the machinery has worked like a city fire department and many thousands of dollars have been saved by the system.

On many of the national forests detailed fire plans were prepared, based on a careful and systematic study of local conditions. The complete fire plan consists of a description of the property exposure and fire hazard and of every means which has been or may be taken to meet any emergency which may arise. The fire plan is prepared by the forest supervisor and is modified and strengthened in the light of the experience of each fire season. Fire plans include a detailed outlining of the system which will, at minimum expense, afford the maximum protection which the conditions demand; an inventory of all fire-fighting equipment; accurate maps showing types of forest cover, danger areas; means of communication and transportation, and location of lookout stations, fire breaks, camping grounds, settlements, and other sources of supply for labor, equipment, food, and forage; determination of the fire liability of each type of forest based on the results of previous fires; means of transportation and communication between all portions of the forest and settlements where help can be obtained; detailed description of the lookout system necessary to cover the forest; what cooperation can be expected during the dry season or at the time of fires, and detailed instructions for each forest officer.

The fire plans have already shown exactly where permanent improvements are most needed, and have aided in the wise allotment of funds for improvement work. They have also supplied every supervisor and district ranger with a definite outline for the construction of trails, cabins, fences, and other projects, so that during rainy weather or at other times of least danger patrolmen can be immediately transferred to improvement work without any lost motion. Other features of the fire plans provide for an accurate system of check patrol by which the district ranger will at all times be aware of the movements of the patrolmen in his district, standardization of fire tools stored at different points, and arrangements to facilitate the purchase and transportation of food supplies.

The disastrous fires of 1910 showed the necessity of a much larger number of pack animals for use in transporting supplies and tools to fire-fighting crews, and a considerable number of such animals were purchased during the year. These are held at convenient points during the dry season, so that they can be utilized quickly. The cost of maintenance of these animals is comparatively small, since for a large part of the year they are kept on Government pasture. They are useful during the wet season in the construction of permanent improvements.

Great progress was made in the fire-protection cooperative agreements with States, railroads traversing national forests, owners of large bodies of timber in and adjacent to forests, and associations of lumbermen. Several railroads are using oil-burning locomotives in heavily timbered districts, and many are clearing their rights of way of inflammable débris. These cooperative agreements mean, in many instances, the material supplementing of the fire-protective force on the national forests during the summer months. In the Northwest there is almost no agency, private or public, which is not lending its assistance to the work of fire prevention and fire fighting. With all agencies in the field working toward a common end the danger of destructive fires must gradually grow less.

The problem of awakening the public mind to the great loss suffered annually from forest fires received much attention during the year. Letters were sent to representative citizens in the vicinity of each national forest, including the proprietors of hotels and resorts, calling their attention to the annual fire loss and asking for their cooperation in fire protection and suppression. In each letter the location of the nearest ranger district was given, together with the name, address, and telephone number of the ranger in charge. Many of the recipients of these letters replied, offering valuable suggestions for the better handling of the fire problem in their vicinity. In a number of instances local telephone companies inserted in their directories suggestions regarding camp fires and instructions as to reporting forest fires when discovered. Some of the railroads traversing national forest lands inserted in their summer time tables, at the request of forest officers, warning notices against carelessness with fires. Through these and many other means public sentiment in national forest States has become alive to the importance of fire protection.

There is a marked improvement in the status of fire-trespass cases. At the beginning of the year 78 cases were pending. During the year there were 93 new cases, making a total of 171 cases for consideration. Of these, 50 were dismissed, 62 were prosecuted, and 17 were settled, leaving only 42 cases pending at the close of the year. The receipts from fire-trespass cases settled during the year amounted to a total of $21,810.70. Incendiarism and carelessness with fires can be largely decreased by promptly initiating legal action against the offenders, and many prosecutions were instigated and convictions secured.

As long as the protective force is inadequate there will always be a large element of uncertainty regarding the possible damage from forest fires. More than four-fifths of all forest fires are caused by man, and are therefore preventable. When a fire has once started, however, the chance of its becoming destructive depends largely on the inflammability of the forest, the time which has elapsed since rainfall, and the wind. These uncertainties and the added hazard which will always obtain from lightning make a much larger patrol force and more active cooperation from the people imperative. Fires must be discovered and extinguished before they obtain a start. A single fire which obtains a good start on an inflammable area and is fanned by a high wind may be impossible to control before it has done immense damage. A large preventive force is the thing needed to insure the national forests and surrounding regions against loss. Although fire organization is being developed to a high degree of efficiency, it is still far below what is needed to guarantee the safety of the Nation's timber. The number of rangers on the statutory roll is sufficient, but there are needed additional men for short periods during the dry season.

As a result of the fire disaster of 1910, Congress appropriated $1,000,000 as an emergency fund to meet a possible similar situation the next year. The seasons of 1911 and 1912 were so favorable from the standpoint of rainfall that very little of this appropriation was used. Nevertheless, there may be almost any year a repetition of the 1910 drought, when it would be necessary to spend a very large amount of money to meet the emergency. Such an emergency fund would be a great safeguard in the protection of the forests. Without it the Secretary of Agriculture would either have to create a deficiency or fail to protect the forests.

REFORESTATION.

Policy and development.—As outlined in the report for last year, reforestation work includes continued experimentation and investigation to find the cheapest and best methods and the seeding and planting of approximately 30,000 acres annually.

Some results of the experimental work are given under the heading "Forest investigations." Reforestation of an intensive character was confined to the experiment stations and to districts 3 and 5, where, on account of unfavorable climatic conditions, failures with reforestation on a large scale have been so persistent that such work should clearly be postponed until methods which promise success can be developed.

The tentative distribution among the districts of the area to be reforested annually is: District 1, 9,000 acres; district 2, 6,000; district 3, 500 (experimental only); district 4, 6,000; district 5, 500 (experimental only); district 6, 9,000.

The reforestation will be by two methods—direct seeding and planting. The area to be planted will depend upon the nursery stock produced. The annual capacity of the existing nurseries will be increased only where it can be done without increasing the cost of maintenance, or where some specific local condition or very definite advantage from such an increase requires such action. In general, the total cost for nursery work for the next few years will remain close to its present figure. With the nurseries maintained at approximately their present capacity, resources will be available for planting nursery stock as it reaches the right size and for seeding to bring the total covered by both methods as nearly as possible to the 30,000 acres planned for.

During the past year, to insure the selection of the most favorable areas, a definite policy was put into effect of making a detailed planting reconnoissance previous to actual reforestation. Where accurate maps are not in existence, the topography is mapped in detail.

To a greater extent than in the past, work was concentrated on a few selected forests and upon one or two definite sites on each forest. This was done both in planting and in direct seeding, but particularly in the latter. The desirability of concentration has been clearly established. It makes possible the preparation of more detailed plans previous to the commencement of the work, the securing of a large supply of temporary labor through advertisement, the reduction of overhead charges, closer and more efficient supervision, and the covering of a larger acreage with the same amount of money. It also facilitates the employment of a small force of well-trained men.

More careful organization of seed collecting and extracting operations has secured more economical methods in this line of work. Seed-collecting operations by the service were confined largely to yellow pine, Douglas fir, lodgepole pine, western white pine, and Engelmann spruce. The large mechanical seed-extracting plants mentioned in last year's report were completed—one for yellow pine on the Harney, two for lodgepole pine on the Medicine Bow and Arapaho, and two for Douglas fir on the Oregon and Snoqualmie National Forests. The plant on the Harney has been tested with a trial run, and will be ready for handling cones collected in the fall of 1912. The lodgepole pine plant on the Medicine Bow was run for several weeks, during which over 3,000 bushels of cones were treated. The Wyeth kiln on the Oregon was in operation slightly more than 100 days, during which 11,834 pounds of seed were extracted from 11,547 sacks of cones. The average cost per pound of extraction of the 10,831 pounds of Douglas fir seed collected was 37 cents, and the cost during the last 40 days of operation after the perfection of the plant was 20½ cents.

The first application of the policy outlined in last year's report of concentration in seed collection in favorable seasons with a proportionate reduction in acreage seeded was made in district 6, to take advantage of a good seed crop of Douglas fir. This policy will result in the organization of the work within each district upon a basis of two or more years' work rather than an annual basis, and should make possible the reduction of costs in the long run by the concentration each year upon the particular part of the whole operation which can be done to best advantage. The areas to be reforested in different districts must therefore be considered as averages by periods of two or more years and not as areas which are to be reforested every year.

In connection with direct seeding, special investigations to solve the rodent problem are being carried on. Where on any particular site it is found impossible to control the rodents, direct seeding is not done. A careful record of the results of past experience has been put into effect and is constantly kept up to date, so that by analysis of these reports it is possible to plan more efficiently future reforestation work.

THE WORK OF THE YEAR.—In the table below is shown the amount of seed of coniferous and hardwood species collected in the six districts, the amounts of seed purchased by the service, and average costs per pound:

Source.	Conifers.		Hardwoods.	
	Clean seed.	Average cost per pound.	Clean seed.	Average cost per pound.
Collected by the Forest Service:	*Pounds.*		*Pounds.*	
District 1	9,215	$2.35		
District 2	11,596	1.48	300	$0.10
District 3	653	.70	8,100	.20
District 4	8,818	1.57		
District 5	2,041	.65		
District 6	15,632	1.66		
Total	47,955	1.68	8,400	.19
Native species purchased	5,164	.99	12,415	.362
Exotic species purchased	1,105	.17		
Grand total	54,224		20,815	

Of the 1,105 pounds of foreign coniferous seed purchased 800 pounds were maritime pine, which cost slightly over 8 cents per pound. The other 305 pounds cost, on an average, 41 cents per pound.

The total amount of seed secured during the fiscal year was 75,039 pounds, at a total cost of $88,326.24.

The total area reforested was 20,543 acres, of which 14,369 acres were sown and 6,174 acres planted, at a cost for seed, nursery stock, equipment, and labor of approximately $130,000. The average cost of reforestation, both by direct seeding and planting, was $6.19 per acre. The acreage reforested was, by species, as follows:

Total area reforested, by species.

Species.	Area reforested.	Per cent.	Species.	Area reforested.	Per cent.
	Acres.			*Acres.*	
Western yellow pine	12,378.6	60.3	Incense cedar	43.0	0.2
Douglas fir	3,896.2	19.0	Other conifers	2,106.1	10.2
Lodgepole pine	1,182.3	5.7	Hardwoods	330.0	1.6
Engelmann spruce	425.6	2.1			
Sugar pine	104.4	.5	Total	20,543.1	100.0
Western white pine	76.9	.4			

The areas sown and planted were distributed as follows among the different States:

Sowing and planting, fiscal year 1912.

State.	Area sown.	Area planted.	Total area reforested.	State.	Area sown.	Area planted.	Total area reforested.
	Acres.	*Acres.*	*Acres.*		*Acres.*	*Acres.*	*Acres.*
Arizona	469.25	13.35	482.60	Nevada	512.00	23.06	535.06
Arkansas	71.00	31.55	102.55	New Mexico	180.66	204.50	385.16
California	632.69	188.60	821.29	North Dakota		30.00	30.00
Colorado	3,694.95	293.15	3,988.10	Oklahoma			
Florida	73.00	12.00	85.00	Oregon	30.57	1,101.22	1,131.79
Idaho	2,025.40	597.76	2,623.16	South Dakota	1,971.25		1,971.25
Kansas		60.25	60.25	Utah	690.88	1,008.81	1,699.69
Michigan	36.11	20.56	56.67	Washington	5.00	30.00	35.00
Minnesota	30.00	.67	30.67	Wyoming	191.35	.17	191.52
Montana	3,754.92	2,403.29	6,158.21				
Nebraska		155.12	155.12	Total	14,369.03	6,174.06	20,543.09

During the year 14,369 acres were sown direct. Of these 14,266.5 acres were sown to conifers at an average cost of $4.06 per acre and 102.5 acres to hardwoods at an average cost of $8.68, or of $4.10 for both conifers and hardwoods. The cost of sowing hardwoods was on an average more than twice the cost of sowing conifers. This was due chiefly to the fact that the sowing of hardwoods was on a small scale.

The planting work included 5,946.5 acres planted to conifers, at an average cost of $10.75 per acre, and 227.5 acres to hardwoods, at an average cost of $19.54 per acre. Of the 5,573,147 plants used 55 per cent were transplants and 45 per cent seedlings. An average of 900 trees to the acre was planted. Most of the stock was older than two years. Experience has proved that it does not pay to use the younger age classes of nursery stock.

The following table shows the number and percentage of trees of each species planted:

Species planted, seedlings and transplants.

Species.	Number planted.	Per cent.	Species.	Number planted.	Per cent.
Douglas fir	2,570,160	46.1	Lodgepole pine	13,290	0.2
Western yellow pine	2,266,441	40.7	Other conifers	237,972	4.3
Engelmann spruce	235,500	4.2	Hardwoods	179,019	3.2
Incense cedar	42,000	.8			
Western white pine	15,415	.3	Total	5,573,147	100.0
Sugar pine	13,350	.2			

A total of 5,946.55 acres were planted during the year with conifers at an average cost per acre of $10.73 and a total of 227.51 acres with hardwoods at an average cost per acre of $19.54. The minimum cost per acre was $4.19, on the Crater National Forest. The average cost of hardwood planting was higher than the cost of coniferous planting, because hardwood planting was done everywhere on a small scale. The handling of the hardwood stock is much more expensive on account of its bulk.

Nurseries.—The annual capacity of the nurseries remained substantially the same as last year. That of the Halsey Nursery, in Nebraska, was increased to raise material for distribution among settlers of the Kinkaid district, as provided for under the agricultural appropriation act of March 4, 1911. The present supply of stock at each nursery is shown below:

Nursery.	Forest.	Seedlings.	Transplants.
Boulder	Helena	6,647,370	704,980
Savenac	Lolo	3,902,800	3,086,300
Trapper Creek	Bitterroot	250,000	332,780
Dakota	Dakota	101,500	292,000
Monument	Pike	1,239,000	833,000
Halsey	Nebraska	4,787,648	936,222
Garden City	Kansas	849,050	54,000
Animas	San Juan	53,250	21,296
Fort Bayard	Gila	309,000	83,700
Gallinas	Pecos	123,000	101,000
Frye Canyon	Crook	200,000	------
Rocky Bayou	Florida	8,000	1,500
Uinta	Uinta	5,548,600	547,000
Wasatch	Wasatch	3,357,000	609,900
Pocatello	Pocatello	4,289,150	53,750
Cottonwood	Boise	62,000	------
Long Gulch	do	280,410	490
Pine	do	23,300	4,600
Flowers	Sawtooth	115,500	3,300
Poorman	Fayette	2,500	------
Pilgrim Creek	Shasta	485,000	392,576
Converse Flats	Angeles	61,100	38,200
Los Prietos	Santa Barbara	------	------
Wind River	Columbia	2,000,000	683,200
Silverton	Snoqualmie	620,000	225,000
Page Creek	Siskiyou	72,428	41,973
Others		905,767	18,125
Total		36,293,373	9,064,892

The average cost of seedlings was $2.50 per thousand, and of trans-
raised for experimental purposes, which is high. At some of the large
plants $6. This cost is increased by the inclusion of the cost of stock

nurseries the costs were much lower. At the Monument Nursery 2-year-old seedlings of yellow pine were raised at a cost of 50 cents per thousand; Douglas fir, at 86 cents; Engelmann spruce, at 50 cents; Austrian pine, at 42 cents; transplants of yellow pine, at $2; Douglas fir, at $1.67, and Engelmann spruce, at $2.73.

Comparison with work of previous years.—Last year practically the only commercial species of coniferous trees of which the seed crop was not below the average were western white pine and the Pacific coast Douglas fir. Because of this the amount of coniferous seed collected was about 4,843 pounds less than in 1911. The amount of coniferous seed purchased was 20,465 pounds less than in 1911, the reduction being mainly in exotic species, the use of which has in general been unsuccessful. Of hardwood seed, 17,979 pounds less than in 1911 were obtained.

The total area reforested was 4,687 acres less than in 1911. The area seeded was 8,866 acres less, while the area planted was increased from 1,995.47 acres in 1911 to 6,174 acres in 1912. The nursery stock ready for planting was first disposed of, and the balance of the funds available was used in seeding. The decrease in the area seeded is entirely within districts 3 and 5, in which, because of adverse conditions, the work has been restricted, and in district 6, where all the funds available were devoted to the collection of seed.

The total number of seedlings and transplants in all the nurseries is now 45,358,265 plants, an increase of 10,506,320 plants in the amount of nursery stock. This increase was due mainly to the fact that some nurseries were below their full capacity, so that the stock could be increased without increasing the cost of maintenance.

The coniferous seed collected by the service cost $1.68 per pound, as compared with $1.24 per pound in 1911, due to a poor seed year for most species and in spite of better organization and equipment. The hardwood seed collected cost 19 cents per pound, as compared with 11.6 cents per pound in 1911. Yet, in general, the cost of seed of the principal species is falling, as shown by the following table for district 2, which illustrates conditions in all districts:

Species.	1909		1910		1911	
	Seed collected.	Cost per pound.	Seed collected.	Cost per pound.	Seed collected.	Cost per pound.
	Pounds.		*Pounds.*		*Pounds.*	
Yellow pine	157	$1.93	[1] 5,899	$0.89	5,147	$0.85
Douglas fir	194	2.53	1,383	1.72	2,679	1.14
Lodgepole pine	42	5.27	1,409	3.92	2,782	1.95
Engelmann spruce	3	5.27	417	3.21	449	1.93

[1] Exclusive of 23,769 pounds from the Black Hills, which were purchased.

When collection was first undertaken the cost of lodgepole pine seed was almost prohibitive on account of the high cost of extraction from the cones, while it can now be produced for less than $2 per pound. Since the cost of extraction determines largely the cost of clean seed, this reduction is especially encouraging. The cost of extraction is being decreased not only by reducing operating costs per pound, but also by securing a larger quantity of seed per bushel of cones. From the following table for district 1, which is characteristic also of practically every district, it may be seen that the cost of both direct seeding and planting has been decreasing from year to year:

Average costs of planting and direct seeding.

	1909		1910		1911	
	Spring.	Fall.	Spring.	Fall.	Spring.	Fall.
Planting	$18.98	$14.32	$35.40	$13.15	$12.75	$7.50
Direct seeding	11.30	3.48	3.36	3.35	6.65	3.80

The average cost of all planting fell from $19.56 per acre in 1911 to $11.05 in 1912 for both hardwoods and conifers, and to $10.73 per acre for conifers, which include most of the acreage covered.

Further reductions in cost are possible, and will come through further cheapening of seed, nursery stock, and field operations. The cost of direct seeding shows comparatively little variation from year to year.

Results.—The results from much of the early planting by the service were poor. On the whole, for the entire area covered on the national forests, reports indicate that about 50 per cent of all the trees planted are living. In some plantations under favorable conditions in Washington, Oregon, and Montana, 90 per cent of the trees planted are now living, but in others under the unfavorable conditions of the Southwest the percentage of living trees is very small. Better results in planting are being secured each year as better stock is being raised and the methods of planting are improved. During the year, even in Arizona, New Mexico, and southern California, where, on account of the extremely unfavorable conditions, success in artificial reforestation was almost despaired of, fair or even good results in small experimental areas have been secured. Good results in planting hardwoods were obtained during the year on the Ozark and Arkansas National Forests in Arkansas and the Wichita National Forest in Oklahoma. The success of direct seeding has been found to depend mainly upon the nature of the site, the preparation of the soil, the time of sowing, and the protection of the seed against rodents.

Some form of preparation of the ground has been found necessary to secure any reasonable degree of success. Broadcasting, except on prepared strips or upon recent burns, has not proved successful. The seed-spotting method has been most successful, particularly upon favorable sites, if done at the proper seasons. Late summer and early fall sowing have in general given best results.

In practically all cases it is necessary to afford some protection to the seeded areas against rodents. It has been found that a single poisoning is not sufficient, that the areas to be seeded must be selected a considerable time in advance, and that the poisoning must be done at regular intervals and over areas larger than will be sown. In general, the increased cost of poisoning is slight, and it provides a very cheap and effective insurance against the destruction of the seed. In Arizona, New Mexico, and southern California even the most careful direct seeding has in almost every instance, owing to the combined effects of drought, frost, rodents, and birds, proved an entire failure. Direct seeding secured a fair stand in States like Washington and Oregon and in the Black Hills of South Dakota, where the climatic and soil conditions were on the whole favorable to tree growth.

Generally speaking, planting has so far yielded better results than seeding, especially on unfavorable sites, but planting experiments have been conducted for a longer period. From the standpoint of results, planting has been cheaper than seeding in many instances, although the initial cost of seeding is considerably less. Because of the smaller initial cost of seeding and the possibility of developing successful methods on favorable sites, a large amount of additional work in seeding under such conditions is justified.

Failures in reforestation were inevitable at the beginning. Without precedents, with a range of conditions varying from humid to arid, it was only through wide experimentation that methods could be developed which would secure results. In the light of the experience gained during the last few years, it is evident that additional progress along this line will be made only by careful, intensive methods which will mean, in case of direct seeding, preparation of the ground and getting rid of seed-destroying animals, and in case of planting, raising larger stock of sufficiently good root development to withstand trying climatic conditions. The lesson so far taught is that reforestation in the West, in order to be successful, must overcome many climatic and biological difficulties, which means intensive and expensive work. In general, the results of the past year have been the most encouraging since the work was begun, and indicate not only that planting is now a safe undertaking under favorable conditions, but that it is or can undoubtedly be made so under unfavorable conditions. It is hoped that still more successful methods of seeding for favorable conditions at least can be developed; continued efforts are certainly worth while. In both planting and seeding better results can in the future undoubtedly be secured at less than present costs.

FREE DISTRIBUTION OF PLANTING STOCK.—The agricultural appropriation act of March 4, 1911, provided for the free distribution of young trees from the Halsey Nursery, Nebraska National Forest, to settlers within the Kinkaid district.

Last year not more than 50,000 trees were ready for distribution. It is expected that 100,000 trees will be available in 1913. In 1914 and thereafter about 400,000 trees can be distributed annually. Not until 1914, therefore, can the free distribution to settlers be made on as large a scale as is desirable. Ninety trees were given to each applicant last year. It is hoped that in 1913 this number can be increased to 250.

A conservative estimate of the cost of 3-year-old trees is $5 per thousand; of maintenance of the buildings and other equipment and of office charges, 50 cents per thousand; of preparing trees for shipment in small lots such as will be sent to individual settlers, $2 per thousand; making a total estimated cost of $7.50 per thousand.

At this rate the cost to the Government of the free distribution of planting stock to the settlers in Nebraska this year will be about $375. In 1914 a distribution of 400,000 plants will cost $3,000.

The species to be grown in the nursery are chiefly western yellow pine, jack pine, and Norway pine, which are likely to give the best satisfaction in the sandy region of the Kinkaid district.

FOREST INVESTIGATIONS.

Experimental studies were conducted in connection with the five important problems of reforestation, management, forest influences, protection, and mensuration. Besides forming a scientific basis for national forest management, the results of these investigations supply the knowledge necessary for the application of the principles of forestry to private timberlands throughout the West. Most of the investigative work was done at the experiment headquarters now established at various points on the forests. Each such station gives chief attention to the problems most typical of and most urgent in the district in which it is located. Thus the management and reproduction of western white pine and larch forests are being studied at the Priest River Station, in district 1; of the Douglas fir, lodgepole pine, and Engelmann spruce forests at the Fremont Station, in district 2; of the western yellow-pine forests at the Fort Valley Station, in district 3; and of the sugar and yellow pine forests at the Feather River Station, in district 5. The latter station and the Priest River Station were established during the year. Facilities for the study of problems relating to the national forests in Minnesota and Michigan were secured by cooperation with the University of Minnesota in the establishment of a station at Cloquet, Minn. A fourth new station, the Utah, was established on the Manti National Forest after the close of the fiscal year.

During the year reforestation was the problem given first attention, the greater number of experiments having to do with seed extraction, nursery practice, and methods and seasons of sowing and planting.

Considerable progress was made in developing methods of extracting seed from the cones of both eastern and western species, and much valuable information obtained on the largest amount of seed that may be extracted from cones of different species per unit of time at different degrees of temperature, the maximum temperature which may be applied to seeds of different species without impairing their vitality, the germinating power of seed extracted at various temperatures, the comparative length of time required for germination of seed extracted with and without artificial heat, and the most economical type of extracting plant.

The source from which seed is collected was found to be of great importance. In general, the best results would be secured if seed produced locally could always be used in reforestation work.

As fast as the experiment stations were able to handle the testing of seed this work was transferred to them. During the year districts 1, 2, 4, and 6 carried on their own tests. The advantage is in having results available when needed, in developing methods of test which answer the particular needs of the district, and in furnishing activities for the experiment stations in winter, when other work is slack.

From the experiments in nursery practice much valuable information was secured as to the depth to which seed should be covered, the most efficient fertilizers for transplant and seed beds, the prevention of damping off of young seedlings, and the watering of plants in the nursery. It was shown conclusively that in all nursery work sowing at a depth greater than one-fourth inch is not advisable. Leaf compost and manure were found to be better than commercial fertilizers for transplant beds, while for seed beds the opposite was true. At the Monument Nursery it was found that the use of dry soil on the surface of the beds and frequent cultivation reduced the loss from damping off. At the Halsey Nursery a system of chemical treatment to combat the disease is being worked out. While seed beds must be regularly sprinkled until germination is complete, indications are that the less water applied after that time the hardier will be the trees. Withholding water from seedlings may result in some loss in the beds, but the ultimate success in the field will more than balance this.

Experiments with different sites for reforestation point to the conclusion that sowing and planting should, as far as possible, be confined to the cool, relatively moist north or east slopes, until planting methods are better developed and the conditions affecting young seedlings more thoroughly understood.

A test of seed-spot sowing of western yellow pine, begun at the Fremont Experiment Station in 1911, showed the lightest covering of soil, one-fourth inch, to induce the greatest germination and survival. The percentage of survival alone, however, was somewhat greater with a one-half-inch covering.

Very promising results were obtained from sowing and planting maritime pine and cork oak on the Florida National Forest and at the Clemson Coast Experiment Station at Summerville, S. C. On the Florida Forest 7 acres sown to maritime pine in March, 1911, now bear a dense stand from 1 to 2 feet high. The cork oak, sown in the spring of 1911, has also done exceedingly well. These results clearly indicate the suitability of the two species to the climate and soil of the Southeastern States.

Good results in reforesting with introduced species were had with yellow pine, jack pine, and Scotch pine on the Nebraska National Forest, and with yellow pine on the Kansas National Forest, while lodgepole pine has been successfully introduced into the Pikes Peak region. Experiments are now under way with Austrian pine and Norway pine on the Nebraska, and with red cedar, jack pine, and Austrian pine on the Kansas Forest. Of the hardwoods so far tried, green ash and cottonwood are the most hardy. Honey locust seems more promising than black locust, osage orange, or walnut.

The vast brush fields on a number of the national forests of northern California, totaling roughly 1,500,000 acres, and the extensive bear clover or tar-weed areas of the central and southern Sierras, both largely the result of repeated forest fires, were studied during the year to determine the possibility of their reforestation. Other studies had in view the protection of planted areas from rodents and the development of methods to reduce the cost of planting.

The trend of experiments in forest management was toward determining the best silvicultural systems and degrees of cutting to secure natural reproduction, problems of the greatest importance in timber sales. These studies are carried on by means of permanent sample plots on which all the trees are carefully measured and recorded. The timber is cut under different silvicultural systems, or thinnings or improvement cuttings are made. An exact record is kept of the amount of timber removed and of the size and distribution of the remaining trees. Measurements taken at regular intervals will show the precise effect of the method used on each plot. A number of experimental cuttings and thinnings have already been made, but none has been executed long enough to yield conclusive results.

The study at Wagon Wheel Gap, Colo., to determine the effect of forest cover on streamflow, described last year, yielded valuable records, although final results can not be obtained until after the denudation of one of the watersheds. Points of great interest already determined are that the surface run-off contributing to what may be called a flood in either stream is less than 1 per cent of the rainfall of any storm yet recorded; that the amount of soil erosion from the forested watersheds is practically negligible; that the relation of maximum flow to minimum flow in 1911 was about 13 to 1, while other watersheds of the region more sparsely covered usually have a ratio of from 20 to 1 to 100 to 1, and that the crest of a flood after heavy fall rains lasting 72 hours occurred in one stream in 2 days and in the other in 4 days, while neither stream had recovered its normal flow 2 months after the rain.

At the Fort Valley Station observations during the year upon the effects of forests on climate proved that the forest is very effective in checking excessive wind movement and evaporation. Conclusive proof will be sought of the influence of the forest in moderating low-temperature extremes.

A contribution of the Forest Service to the final report of the National Waterways Commission (S. Doc. 469, 62d Cong., 2d sess.) brought out an entirely new point of view as to the relation between the forests of the Coastal Plains and Appalachian Mountains and the humidity of the central and prairie regions.

The damage caused by light surface fires, which find some advocates among lumbermen, was the subject of investigation on a number of forests. A record of 1,184 butt logs on the Whitman Forest, in Oregon, showed 22.8 per cent to be more or less scarred, while 18.6 per cent lost an average of 46 board feet apiece by scale through fire damage, and many more were pitchy.

In cooperation with the Bureaus of Entomology and Plant Industry studies were conducted on a number of forests of insect infestation and tree diseases.

On the Klamath National Forest 927 acres were treated for insect infestation, the area protected by such treatment amounting to 29,000 acres, with a stand of 330,000,000 feet of timber, valued at $660,000. The cost of combating the infestation amounted to $3,000.

Attempts to eradicate the dendroctonus beetle on the White River Forest by cutting and barking infected trees and on the San Isabel by girdling did not prove entirely successful. On the Pike Forest, however, infestation was checked.

Studies of *Phoradendron juniperium* in burls of incense cedar, of *Hypoderma* sp. on shore pine, and of the age of infection of incense cedar with dry-rot were completed.

A pathological survey of the Mono, Tahoe, Eldorado, Stanislaus, Sierra, Lassen, Klamath, and Shasta Forests and the Yosemite National Park was made during the year. A manual of forest-tree diseases was prepared by the forest pathologist in California for the use of forest officers.

A study of the deterioration of fire-killed timber in Montana and Idaho showed conclusively that in western white pine blue stain and check set in almost immediately after a fire; that the blue stain is confined to the sapwood; and that check is limited in extent and blue stain most severe in trees which retain their bark. Studies were begun to ascertain the difference between the net log scale and net lumber scale of fire-killed timber and to determine the effect of fire-killed timber in the reduction of grades.

Commercial tree studies of Douglas fir, lodgepole pine, western yellow pine in Oregon, western red cedar, and sugar pine were completed during the year. These studies cover the growth, volume, and yield of the tree and its utilization and life history.

RANGE MANAGEMENT.

Seven years of actual range administration has convincingly demonstrated the correctness of the fundamental principles upon which it is based by tangible and striking results. A maximum of forage production and a maximum of benefit to the stock industry and to the meat-eating public are combined with protection of other forest interests and with healthy community development. Overgrazing has been stopped, range productiveness raised, losses from predatory animals, poisonous plants, and contagious diseases of stock lessened, inaccessible range opened to use, and each class of stock assigned to the kind of range best adapted to it.

Appreciation by the stock growers of the fact that regulated grazing benefits them is steadily growing. The result is a strong bond of common interest and sympathetic understanding. It is now possible to solve, with satisfaction to both parties, many administrative problems which formerly gave trouble. Helpful cooperation and assistance is the return which the Forest Service receives for greatly improved conditions of live-stock production and assured permanence of the stock industry.

GRAZING CAPACITY OF NATIONAL FORESTS.

Of the 160 national forests in the continental United States on June 30, 1912, 3 produce so little forage that their use for grazing purposes is unprofitable. The remaining 157 were under grazing administration. The total number of domestic animals which may normally be grazed within these forests has now been closely determined and hereafter will remain fairly constant unless the areas of the forests are materially changed, except as improved conditions due to more intensive methods of range utilization and to fuller knowledge of range improvement problems make increases possible. The need for sweeping reductions to stop damage no longer exists.

The area under grazing administration at the close of the year was 346,000 acres less than at the close of the previous year. A much larger area was eliminated from the forest, but was offset by the addition of other lands. Upon lands added after the season had commenced no permits were required. Further, in many instances the use of lands, elimination of which was pending at the beginning of the grazing season, was allowed free of charge and without permit, while the lands actually eliminated included some of the best and most heavily stocked ranges. Nevertheless, the number of animals grazing under permit was very materially increased. Increased carrying capacity due to regulated grazing made this possible.

Numerous changes in the number and kind of stock authorized to occupy each of the national forests have followed more exact knowledge of the kind of stock to which each range unit is best adapted, the period during which it may be used to the best advantage, and the number of stock it will support. Some grazing authorizations were increased, others reduced, but in most instances a reduction in the number of one kind of stock was accompanied by an increase in the number of another kind. The total grazing authorizations for 1912 were: Cattle and horses, 1,861,678; swine, 57,815; and sheep and goats, 8,502,816. These figures represent the estimated normal grazing capacity of all of the national forests and exceed the number for which permits were taken out.

Upon eight forests reductions in the number of stock authorized resulted in the exclusion of stock that had previously occupied the range. Reductions of this character totaled 4,300 head of cattle and horses and 64,000 head of sheep and goats. Upon one of these forests, the Manti, the reduction of 2,000 cattle and horses and 27,000 sheep was ordered in 1911, but was deferred until the season of 1912 to afford the stock growers an opportunity to dispose of the excess stock without loss. There are a few other forests where reductions to stop damage appear to be necessary, but it has been deemed best to defer these reductions until conditions become more favorable for the disposal of the stock which will be excluded. Reductions of this nature have not been initiated by the Forest Service alone, but almost always upon the request of the citizens who lived upon or adjacent to the ranges and who believed the reductions were necessary to protect either their domestic or their irrigating water supply, or both. This was especially true in the Manti case.

There is some fluctuation in the demand for range, which may cause a temporary waste of forage resources within limited areas, but, generally speaking, the only national forests which are not stocked to their safe grazing capacity are a few in northern California and central Colorado and those in northeastern Washington, northern Idaho, and northwestern Montana. In these forests there is considerable summer range suited to sheep grazing which may be used from three to five months each year. Most of it is difficult of access and remote from spring, fall, and winter ranges, and generally can only be reached by railroad shipments, so that despite the best efforts of the district officers much of it remains unutilized. There has, however, been an encouraging increase in the number of sheep grazed in the northwestern forests, and the results have been decidedly advantageous both to the Forest Service and to the sheepmen. As the railroads have signified their intention to grant satisfactory feed-in-transit rates the prospects are favorable for a full utilization of the ranges. Summer feed for an additional 100,000 head of sheep may readily be secured in the forests of northern Idaho and northwestern Montana if these railroad rates are established.

RANGE CONDITIONS.

Throughout Colorado, South Dakota, Wyoming, northern Utah, eastern Idaho, and southeastern Montana the fall of 1911 was marked by a severe drought, and within this region the earlier promise of an abundant season did not materialize. With a forage crop much below normal the demand for range was augmented by the exceedingly unfavorable conditions upon outside ranges. Some extra stock was provided for, and except in a few isolated instances all stock under permit was in good flesh when removed from the forest ranges.

Throughout the remainder of the West range conditions during the same period were normal or better, and the ranges were in fair to excellent condition at the close of the season.

Within the region previously visited by drought the winter of 1911–12 was most severe. There was a pronounced shortage of winter feed, and heavy losses of stock occurred in Colorado, Wyoming, and southeastern Montana, notwithstanding that heavy sales had lightened the demand and that every effort had been made to provide adequate pasturage and winter feed. Conditions elsewhere were favorable except in Arizona, where drought and shortage of feed caused a heavy loss of ewes and lambs upon the desert ranges. California also suffered from drought, but early spring rains relieved the situation.

During the spring of 1912 exceptionally heavy falls of snow and rain continued until the approach of summer. Many of the lambing grounds were covered with deep snow when lambing began. There has been a gradually growing tendency to advance the date of lambing, and the severe storms during the lambing season caused a most unusual loss of ewes and lambs. Losses of ewes amounting to 20 per cent or more and lamb crops 25 to 33 per cent below the average were reported from northern Arizona, New Mexico, Utah, and Nevada. Cattle in the same region entered the forests in poor condition. In the coast States the spring season was favorable and no spring losses have been reported. After June 1 the weather became warm and clear, there was an abundance of moisture in the ground, and an unusually plentiful crop of forage developed.

A period of drought affords a searching test of the advantages of a regulated range. For a series of years the forest ranges have stood this test with credit. Within the region visited by the drought the forage productivity of the range was much below normal, and it was necessary to provide feed for many stock from depleted outside ranges; yet practically all stock left the national forests in fair flesh and generally in prime condition. The winter losses did not occur within the national forests. The spring losses were mainly due to the effort to lamb sheep upon open ranges when the climatic conditions make the operation hazardous at best. The heavy losses which occurred were the result of circumstances which can not be controlled, not of any defect in the administrative system.

Cattle prices reached new high levels during the year, while the prices of sheep and wool strengthened materially. The cattle industry has received a new impetus, and the demand for cattle range will inevitably increase. While many sheep changed ownership, they remained in the same locality, and there has been no marked diminution in the demand for sheep range. The prospects are that the demand for forest range next season will equal or exceed that of past years.

IMPORTANT CHANGES IN LIVE-STOCK INDUSTRY.

The beneficial results of range regulation and control have led the stock growers to improved methods. Permittees are voluntarily constructing many miles of drift fence to confine stock to the allotted ranges, are greatly increasing the quantities of salt placed upon the range, are making better provision for wintering their stock, are buying and breeding superior grades of stock, and finally are cooperating with each other in the handling and management of the stock along lines which insure a minimum of damage and effort and a maximum of return.

Perhaps the most important change which is taking place in the industry is due to the curtailment of the unreserved and unappropriated range outside of the forests, partly through homestead settlement and other forms of alienation and partly through the deterioration resulting from misuse. Many outfits finding their customary ranges depleted, occupied, or rendered impossible of access, have endeavored to secure grazing privileges upon the national forests. The rapid appropriation of the choicest lands and areas which control large tracts of grazing land has emphasized the value of the national forest range, and there is a growing tendency to remove stock from the unreserved lands to the forest lands.

A few years ago cattle prices were low and the sheep industry was at the high tide of prosperity. Consequently many stock growers disposed of their cattle and engaged in the sheep business. More recently cattle prices have risen rapidly while sheep prices have slightly declined, and on some of the national forests there is a pronounced tendency to replace sheep with cattle. In the States where the sheep industry is dominant the trend is still from cattle to sheep. Except when disturbed by abnormal economic conditions the development of the live-stock industry within a given State is influenced largely by the natural suitability of the grazing lands for the production of a certain kind of stock, and the passing of the era of comparatively higher prices for mutton and wool is resulting in a more normal stocking of national forest ranges.

GRAZING TRESPASS.

Both innocent and criminal trespass have decreased. The new cases numbered 20 less than the preceding year. The following table covers all grazing trespass cases:

Year.	Cases pending beginning of year.	New cases during year.	Total cases.	Dismissed.	Prosecuted.	Settled, innocent.	Settled, willful.	Cases pending close of year.
1911	117	197	314	98	8	73	31	104
1912	104	177	281	40	49	115	17	60

The uniformly favorable court decisions have tended to decrease cases of willful trespass, and it is believed that this class of trespass will continue to grow less. Cases of innocent trespass due to carelessness of herders and other causes will, of course, occur, but it is anticipated that settlement of these will be easily secured without resort to court proceedings. The prosecution during the past year of herders and camp tenders for criminal trespass, whenever it was found they had acted in violation of the orders of the stock owners, followed by the conviction and punishment of several of them, has resulted in increased care and a decreased number of trespass cases of both kinds. Heretofore trespass proceedings have usually been brought against the owners.

In the case of the Newcastle Land & Live Stock Co. for a trespass upon the Sundance National Forest the jury, in addition to the value of the forage consumed by the trespassing sheep, allowed the Government a sum to cover the damage to forest reproduction. Since this is the first instance in which such a jury verdict has been obtained, it establishes an important precedent.

ADVISORY BOARDS.

The Forest Service is in cooperation with 84 officially recognized live-stock associations, of which two are national in scope, one a State organization, and 81 local associations composed mainly of stock growers using the national forests. Sixteen new associations were recognized during the year. The men selected by the stock growers to represent them in their dealings with the Forest Service worked unselfishly and most effectively for the betterment of range conditions, and the service which they rendered was of great value.

Formerly organized primarily for the adjustment of differences with the Forest Service, the principal purpose of these associations is now constructive. The satisfactory adjustment of administrative problems has removed the need for stockmen to combine for the protection of their common interest against unfavorable methods of regulation, if such a need ever existed; but a steadily growing need exists for cooperation in the development of more advanced methods of range utilization and control. In working out these problems the Forest Service needs the assistance of the men who actually use the range. Matters of vital interest to large numbers of stock growers are involved. The local live-stock association with its officially recognized advisory board affords a medium through which each permittee may secure actual and effective representation in the working out of changes along the best lines. Fortunately there is a growing appreciation of this fact and the efforts made to secure the organization of permittees have been reasonably successful.

PERMITS.

Paid grazing permits were issued as follows:

Grazing permits issued and number of stock grazed under permit, fiscal year 1912.

State	Cattle, horses, and hogs.				Sheep and goats.			
	Permits issued.	Number of stock grazed.			Permits issued.	Number of stock grazed.		
		Cattle.	Horses.	Hogs.		Sheep.	Goats.	To lamb.
Arizona	1,681	241,334	8,218	361	183	415,074	7,323	213,802
Arkansas	4	253						
California	2,521	169,361	10,403	3,480	367	429,413	15,235	3,561
Colorado	2,796	250,960	8,801		446	777,836	2,079	101,187
Florida	37	434		163	5	510		
Idaho	1,423	86,722	8,297		687	1,516,603		45,367
Kansas	108	10,712	220		1	233		
Michigan								
Minnesota								
Montana	1,924	115,681	15,306		388	686,388	1,270	20,499
Nebraska	112	43,140	1,669					
Nevada	369	56,987	5,698		105	495,533	1,400	18,030
New Mexico	1,813	103,587	5,900	252	629	425,976	56,283	241,374
North Dakota	9	232	128					
Oklahoma	30	4,039	184					
Oregon	1,400	85,413	11,959	74	565	885,210	9	46,882
South Dakota	401	9,917	2,173					
Utah	5,537	134,916	10,622		1,544	991,109		288,759
Washington	209	7,832	739		104	147,008		
Wyoming	814	81,505	5,026		289	696,997	250	79,525
Alaska								
Total	21,188	1,403,025	95,343	4,330	5,313	7,467,890	83,849	1,058,986

Compared with 1911, there were increases in stock grazed under permit of 51,103 cattle, 3,827 horses, 96,143 sheep, and 6,181 goats. The total net increase was 1.76 per cent. This taken in connection with the reduction in area already noted (p. 515) shows how regulated use and protection is augmenting the forage supply. The number of cattle and horse permits issued increased 3.37 per cent and sheep and goat permits over 4 per cent.

The average number of cattle and horses per permit was 70.7 head as against 70.6 head in 1911, and of sheep and goats 1,421 head as against 1,459 in 1911. These figures show that more users as well as more use are provided for.

The number of permits issued, by grades, in 1912 and 1911 are shown below:

CATTLE AND HORSE PERMITS.

	1912		1911	
	Number.	Per cent.	Number.	Per cent.
Grade 1, 1 to 40 head	14,042	66.27	13,419	65.46
Grade 2, 41 to 100 head	3,963	18.70	3,910	19.08
Grade 3, 101 to 200 head	1,749	8.26	1,735	8.46
Grade 4, over 200 head	1,434	6.77	1,435	7.00
Total	21,188	100.00	20,499	100.00

SHEEP AND GOATS.

Grade 1, 1 to 1,000 head	2,640	49.69	2,521	49.38
Grade 2, 1,001 to 2,500 head	1,990	37.46	1,923	37.67
Grade 3, 2,501 to 4,000 head	393	7.39	367	7.19
Grade 4, over 4,000 head	290	5.46	294	5.76
Total	5,313	100.00	5,105	100.00

Range stock holdings of less than 200 head of cattle and horses or 2,500 head of sheep or goats are counted small outfits. Over 92 per cent of the permits issued were for less than these numbers. The percentage of small permits was slightly greater than in 1911.

The percentage of approved applicants who failed to pay the grazing fees and utilize the privileges allotted to them was 8.3 per cent, an increase of 0.5 per cent over the previous year. This was due in part to the fact that many approved applicants were prevented by high prices from securing the stock which they had intended to graze under permit, and in part to the fact that many payments of grazing fees were deferred because of the late spring and the impossibility of utilizing the range until after the end of the fiscal year.

The approval of applications for the grazing privilege for five-year periods, authorized upon 54 forests, has been discontinued upon 7 because of a lack of demand for applications of such character. Upon the remaining 47 forests only an insignificant proportion of the permits are based upon term applications. There is no general tendency to enter into agreements covering periods of more than one year, because stock growers feel assured of adequate range, certainty of tenure, and freedom from excessive reductions. Many holders of term permits are voluntarily relinquishing them, preferring the greater freedom of operation obtainable under annual applications.

Except on forests where the system is now in effect, the approval of five-year applications will be authorized only when requested by 25 per cent or more of the permittees, by petition or through the medium of a recognized advisory board.

For the convenience of stockmen who need to cross national forest lands to reach grazing grounds outside of the forests, special driveways are established over which the stock may be driven under crossing permits. Many of these are extremely long and are used by large numbers of stock. They must be wide enough to furnish the animals the forage needed en route. The sheep driveways in the Coconino National Forest contain 105,000 acres; in the Tonto, 85,000 acres; in the Carson, 73,000 acres. The exterior boundaries are carefully marked, and rangers are detailed to accompany the stock on the trail and see to it that they are not unnecessarily slow and do not trespass upon the adjoining ranges. No charge is made for crossing permits, although they involve considerable administrative expense and a considerable aggregate of free forage in transit.

The total number of crossing permits issued during the year was 2,845, covering 5,174,052 sheep and goats and 89,877 cattle and horses. Crossing permits are not required for small bands of stock which are driven along public highways or which do not graze upon national forest lands en route.

USE OF PRIVATE LANDS.

The arrangement so successfully followed for several years, under which the owners or lessees of unfenced private lands within the national forests, on waiving exclusive use of such lands, receive a free permit for the number of stock which their lands would support under the regulations, was continued with some slight changes. Permits of this class numbered 1,482, or 217 more than in 1911. They covered 60,665 cattle and horses, an increase of 3,071, and 466,212 sheep and goats, an increase of 73,620. The acreage involved was 2,526,941, an increase of 108,741.

The cooperative agreement with the Atchison, Topeka & Santa Fe Railroad Co. was continued during the present year, the terms remaining unchanged. These lands lie within the Zuni National Forest, in the State of New Mexico, and permits issued by the railroad company for its quota of the grazing privileges were for 4,495 head of sheep.

The informal cooperative agreements with the Northern Pacific Railroad and with the Weyerhaueser Land Co. were continued throughout the year with the same satisfactory results as heretofore. These companies took our estimate as to the capacity of their lands, and in the case of the Northern Pacific Railroad the same charge per head is made as our grazing fees, and the lands are leased to permittees who are entitled to graze upon the lands adjacent to them in the national forest.

PROTECTION AGAINST DISEASE.

Excepting scattered cases of blackleg and anthrax, practically no loss of stock from communicable diseases occurred within the national forests. All animals which have been exposed to infectious or communicable diseases must be submitted to rigid inspection by representatives of the Bureau of Animal Industry and pronounced free from disease before they are allowed to occupy the forest ranges. In this way the forest lands are protected from dangerous infection. The relations between members of the Forest Service and the Federal and State officers charged with the duty of enforcing quarantine regulations and stock sanitary laws continued thoroughly harmonious and closely cooperative.

No inspection of sheep was required within districts 1, 5, and 6. Lip-and-leg ulceration developed to a limited extent on the Custer Forest, in Montana, but quarantine was not considered necessary. Inspection of sheep and presentation of certificates showing freedom from disease was required upon the Durango, San Juan, Cochetopa, Montezuma, Uncompahgre, and Rio Grande Forests, in Colorado; the Cache, Caribou, and Pocatello Forests, in Idaho; and all forests in the States of New Mexico, Nevada, and Utah, excepting the Ashley Forest. Sheep scabies has been so thoroughly eradicated in Arizona and the lip-and-leg epidemic is so well under control in Wyoming that inspection was not deemed necessary in these States

Inspections of cattle for mange were required upon the Fremont and Deschutes Forests in Oregon, the Kansas Forest in Kansas, and the Lewis and Clark Forest in Montana.

Texas fever occurs only within the Cleveland, Wichita, Arkansas, and Ozark National Forests, and within the two forests first named it is rapidly being brought under control. During the year the Forest Service assisted the Bureau of Animal Industry in the construction of a 6-mile extension of the quarantine drift fence along the international boundary line in southern California and in the survey of a right of way for an additional extension which will be 33 miles in length. The completion of this fence will prevent the movement of tick-infested cattle across the international boundary. Three grazing permits for 106 head of cattle and horses were canceled on the Cleveland Forest at the request of the Bureau of Animal Industry to strengthen the quarantine. It is anticipated that the Cleveland Forest will be entirely freed of Texas fever within a comparatively short time. On the Wichita Forest the periodic dipping of permitted cattle was continued under the supervision of a representative of the Bureau of Animal Industry. The drift fences and dipping vats constructed during the previous year are fully accomplishing the purposes for which they were designed, and it is believed that the forest will be completely freed of ticks within a year or so. On the Arkansas and Ozark Forests no effective progress in tick eradication can at present be made, but the residents of these forests are awakening to the importance of this work and ultimately it is hoped to secure their hearty support and cooperation, after which steps will be taken to clean the forests.

PROTECTION AGAINST WILD ANIMALS.

Predatory animals harmful to live stock and game animals were killed by forest officers as follows:

Predatory animals destroyed, fiscal years 1911 and 1912.

State.	Bears.		Coyotes.		Mountain lions.		Lynxes.		Wild cats.		Wolves.		Wolf pups.		Total.	
	1911	1912	1911	1912	1911	1912	1911	1912	1911	1912	1911	1912	1911	1912	1911	1912
Arizona	15	22	288	196	33	62	10	3	110	89	16	12	----	----	472	384
California	37	12	743	478	5	3	15	2	193	160	3	2	2	----	998	657
Colorado	11	18	1,008	824	8	3	2	4	70	73	31	4	25	8	1,155	934
Idaho	25	35	1,328	1,010	1	7	3	3	52	82	21	21	----	20	1,430	1,178
Kansas	----	----	------	2	----	----	----	----	----	----	----	----	----	----	-------	2
Minnesota	1	----	------	------	----	----	----	----	----	----	----	----	----	----	1	------
Montana	20	29	183	269	1	8	3	18	15	11	12	27	5	36	239	398
Nebraska	----	----	49	31	----	----	----	----	----	----	----	----	----	----	49	31
Nevada	----	----	137	66	1	----	----	----	5	1	----	----	----	----	143	67
New Mexico	33	9	250	94	28	21	23	30	77	26	67	33	11	13	489	226
Oklahoma	----	----	45	38	----	----	----	----	58	32	----	----	----	----	103	70
Oregon	23	11	743	517	4	6	4	7	108	53	3	18	----	11	885	623
South Dakota	----	----	33	71	----	----	----	----	----	12	----	2	----	----	33	85
Utah	2	19	1,289	671	2	3	3	5	125	83	11	4	----	19	1,432	804
Washington	40	20	83	9	3	3	4	2	19	7	----	----	6	----	155	41
Wyoming	6	3	308	502	2	----	5	11	38	7	8	6	20	53	387	582
Total	213	178	6,487	4,778	88	116	72	85	870	636	172	129	69	160	7,971	6,082

The total number killed was 23.7 per cent less than in 1911. The number of wolf pups killed increased 132 per cent, mountain lions 32 per cent, and lynxes 18 per cent; but 16 per cent fewer bears were killed, 26 per cent fewer coyotes, 27 per cent less wild cats, and 25 per cent less wolves. This is due not so much to a relaxation of vigilance as to a diminution in the number of animals. The losses of live stock from predatory animals are much smaller than before the service began to rid the forests of noxious animals.

The work of eradicating prairie dogs and other range-destroying rodents within the national forests was conducted throughout the year by the Biological Survey, except in a few forests where the Forest Service completed work initiated by it in previous years. Extensive poisoning operations were conducted by the Biological Survey on the Coconino, Cochetopa, and Pike National Forests, and by the Forest Service on the Rio Grande, San Isabel, Kansas, Leadville, and Nebraska Forests. There is still an enormous acreage of prairie-dog towns within the forests, and it will be necessary to enlarge the work greatly if the ranges are to be rid of these pests.

PROTECTION AGAINST POISONOUS PLANTS.

As in previous years, an earnest and successful effort was made to minimize the loss of live stock from poisonous plants. The work of determining poisonous species and of locating and marking areas where such plants occur in sufficient abundance to be harmful was extended with highly satisfactory results, and the loss of live stock was low as compared with previous years. Much of the present loss is avoidable, being due to carelessness in herding and a disregard of warning notices, or to the grazing of stock which is hungry and especially susceptible to poison upon areas where the poisonous character of the vegetation is readily apparent.

Arrangements have been made with the Bureau of Plant Industry for a study of plants poisonous to live stock in Montana. The Forest

Service will contribute toward the cost of the work by furnishing the buildings and pastures necessary for the prosecution of the study, and by paying the salary and expenses of one investigator.

FORAGE AND RANGE INVESTIGATIONS.

Further material progress in grazing administration now awaits fuller knowledge of range conditions. As the open range grows less the importance to the country of increased output from the national forest stock industry rises. Although the present money value of the forage utilized annually is very great, there is urgent economic need both for its more perfect utilization and for its augmentation. Neither can be effected without careful technical observations and exact scientific data. A close study must be made of the character and condition of all forest lands and their products; the character and extent of the damage to tree growths and watersheds which is caused by the presence of live stock within the forests, and the means of minimizing or preventing such damage; the extent to which forage resources are wasted or destroyed by present methods of utilization, and the ways in which the waste or damage may be reduced; the distribution and economic importance of all of the herbaceous plants occurring within the forests; the means of promoting the growth of economically valuable plants upon denuded areas, by natural or artificial methods of reseeding; and new methods of handling stock by which the highest degree of beneficial use will be obtained.

The most important feature of the range investigative work at the present time is the completion of a general reconnoissance covering all grazing lands in the forests. This has for its object a kind of stock taking of the range resource as it now exists. Careful data are thus gathered concerning forage conditions and the various factors which govern production. During the year detailed reconnoissances were inaugurated upon the Manti and Minam Forests, and those initiated during the preceding year on the Coconino, Medicine Bow, and Targhee Forests were continued. The reconnoissance of the Deerlodge Forest was temporarily suspended during the last half of the year.

Several studies are under way to determine the amount and severity of the damage to forest reproduction caused by the grazing of different kinds of stock, the time and character of the injury, and its effect upon tree growth. Thus far the studies have been confined to the yellow pine type, but at the close of the year preparations were being made to extend them to the aspen and other types. The object of the studies is to collect authentic information upon which to base definite plans of management of stock grazing in different types of forest. The studies on the Coconino and Shasta Forests were continued, and new studies were initiated on the Malheur and Payette Forests. A general study of the effect of grazing upon erosion, stream flow, and purity of water supply was initiated just prior to the end of the year.

The study of the distribution, life history, and economic importance of the herbaceous plants growing within the national forests is increasing in importance. Over 4,000 specimens were collected and identified during the year, and economic notes for each species were prepared. A considerable number of previously unknown species were collected.

Over 500 artificial reseeding experiments, conducted upon 85 forests, tend to prove that artificial reseeding of range lands is practicable only under the most favorable conditions and upon comparatively limited areas. The intensive study of means of regenerating depleted ranges by natural reseeding, conducted on the Wallowa Forest, was discontinued at the close of the season of 1911. The principles developed by this study are being given practical application upon a number of national forests. Upon the Hayden Forest the application of the principles is in accordance with a carefully prepared working plan which provides for studies of the effect of alternate grazing, limited grazing, and total exclusion of stock.

The study of the relation of soil acidity to the growth of plants continued throughout the year.

The experiments within the coyote-proof pasture on the Wallowa Forest were completed at the close of 1911, having fully demonstrated the advantages of this method of handling sheep, and the pasture has been turned over to the Biological Survey, which has stocked it with elk. The study to determine the practicability of using small coyote-proof inclosures in connection with range lambing grounds was continued, with results strongly confirmatory of previous findings. The saving which is effected by the reduction in the amount of labor required and in the loss of sheep more than offsets the cost of the construction and maintenance of the inclosures. The inclosures will be maintained for a number of years to serve as examples to stock growers, and observations will be made each year. No other detailed experiments to determine improved methods of handling stock were carried on during the year, but general observations were made and plans were prepared for future studies of methods of using range without water for sheep grazing; of the most effective and economical methods of developing stock-watering places upon forest lands; of methods of reclaiming mountain meadows depleted by erosion; of improved methods of handling sheep; of methods by which the grazing capacity of forest lands may be determined with more exactness; and of the extent to which the grazing of stock minimizes the fire risk. Adequate prosecution of the range investigative work calls for a larger force than could be employed with the funds available.

GAME PRESERVATION.

There were no additions during the year to the number of game refuges or preserves within the national forests, nor was there any material change in the status of those previously existing, viz, the Wichita and the Grand Canyon national game refuges and the various State game preserves located within the Bighorn, Boise, Gallatin, Monterey, Minnesota, Superior, Teton, and Targhee National Forests. The majority of the forest officers engaged in administering these areas hold commissions as deputy State game wardens and effectively assist State officers in enforcing the local game laws. Throughout all of the national forests a vigorous effort was made to protect the game animals and birds from slaughter and molestation within their natural breeding grounds, while the destruction of predatory animals and the regulated grazing of domestic live stock favored game preservation. The activities of the service contributed largely to the success of the movement to protect and perpetuate all species of game birds and animals.

No attempt has been made to stock the Grand Canyon game refuge with introduced species, and the only game animals within the refuge are those indigenous to the locality, which have multiplied encouragingly.

The buffalo herd on the Wichita, which when introduced in 1907 numbered 15 head, now contains 39 head. Nine calves were born during the year. The herd is in thriving condition, the buffalo having become thoroughly adapted to their new environment. No losses occurred. The elk herd was increased by 8 head shipped from Jacksons Hole, Wyo., in March, 1912, but 3 of these animals died shortly after their arrival at the refuge, presumably from injuries received in transit. The herd now numbers 12, of which one is a calf born in 1912. Like the buffalo, they are in splendid physical condition and free from Texas fever. The attempt to introduce antelope has met with poor success, although the country formerly was an antelope range; only 2 head survive out of a total of 10 placed within the inclosure. The cause is not definitely known. Additional animals will be secured if possible. Introduced wild turkey are doing well and give promise of large increases. The native deer are increasing rapidly, as are the quail and other native game birds. The nature of the Wichita game preserve makes it most interesting, and it is visited annually by a large number of people.

The Biological Survey cooperated with the Forest Service in stocking national forests with elk shipped from Jacksons Hole, Wyo. In addition to the 8 head placed on the Wichita, 14 head were placed in the Billy Meadows grazing experiment pasture in the Wallowa National Forest, and 20 head were liberated within the Sundance National Forest in Wyoming. It is hoped that the natural increase of these small bunches will ultimately stock the forests in question. Other shipments of elk were distributed by the States of Montana and Wyoming to points where the animals will range chiefly within national forests.

Stockmen, especially sheep owners, are uneasy lest the location of small bands of elk in ranges now utilized for stock grazing will, as the elk increase in numbers, eventually result in exclusion of stock. Game animals as they increase in number must be provided with more and more range or else suffer for food. It is believed that future shipments of elk for such purposes should be made only to those forests which either are not available for stock grazing or are natural game regions, more or less stocked with game at the present time. Under such a plan specific areas of limited extent, which are relatively undesirable for domestic stock, would be given up to game, thus reestablishing them in regions naturally well adapted for them, and perhaps opening the way to the breeding of game as an auxiliary meat supply, but without compelling any material curtailment of the stock industry. Such a system would entail provision for utilizing the increase of the game animals above the number which the range given over to them would support, otherwise the game would propagate only to starve.

The migration of elk during the winter season into the national forests surrounding the Yellowstone National Park, when the snow in the park compels them to seek food elsewhere, creates conditions that call for action. Three parties are concerned with the problem: (1) The State, represented by the State game warden; (2) the park authorities, who control the major portion of the ranges used by the elk during the summer season; and (3) the Forest Service, which controls a large part of the range used by the elk during all seasons. A census of the elk in the entire Yellowstone region was taken during the past summer. With this as a basis it is hoped to secure cooperation of the three authorities concerned in order that a definite policy for the future handling of this rather interesting problem may be formulated.

Fish secured from the Bureau of Fisheries have been used to stock streams within a number of the national forests, and this phase of game preservation receives increasing attention.

WATER DEVELOPMENT AND DRIFT-FENCE CONSTRUCTION.

Full utilization of the range resource requires that much should be done to make water available for stock and to control their movements by the construction of fences. Both classes of work constitute permanent improvements of the forests, and are reported on under that head; but occasion may appropriately be taken at this point to present, as a part of the general grazing policy, certain considerations which apply to these classes of improvements. For details, reference is made to page 530.

Since grazing on the national forests will evidently be permanent, improvements to increase their usefulness for this purpose should be made with this fact in mind. The Government owns thousands of springs, seeps, and watering places which are used by the stock grazed on the forests, and its water supplies should be systematically and methodically developed until every forest watering place needed is in good shape. Money spent in such improvements will be amply repaid in the form of increased range use.

On many forests permanent drift fences would greatly increase the carrying capacity of the range. Such fences would often quickly pay for themselves through increased receipts. They are so desirable that stockmen are in many instances ready to build them at their own expense. This, however, experience has proved to be not altogether a satisfactory plan, for the reason that if administrative needs call later for a change or removal of the fence or other improvement, or for any diminution of use of the range by the stockman who built it, friction and discontent follow. A definite amount should be assigned each forest each year for these improvements.

SPECIAL USES OF LAND.

USE FOR WATER-POWER PURPOSES.

The water powers found within the national forests will ultimately be of great value to the country. It is estimated that there is approximately 12,000,000 horsepower which can be developed from natural stream flow. This amount can be greatly increased through the regulation of stream flow by storage. Numerous excellent reservoir sites are available.

The regulations adopted by the department on December 28, 1910, have now been in force long enough to demonstrate their practicability. On the whole, they are favorably received by developers. The propriety of making a charge for the use of the land occupied and the reasonableness of the amount fixed by the regulations is generally conceded. That feature of the permit which requires development to be made within a reasonable time is working satisfactorily and is serving to keep out speculators who have hitherto sought to appropriate sites only that they might later dispose of them to the real developer.

The following table shows the extent to which water-power development is taking place on the national forests:

	Transmission lines only.	Reservoirs, conduits, power houses.
Permits in force June 30, 1912:		
Commercial—		
Preliminary	----------	39
Final	73	84
Noncommercial	5	62
Total	78	185
Projects operating June 30, 1912:		
Commercial	60	56
Noncommercial	4	28
Total	64	84
Projects on which construction had begun June 30, 1912:		
Commercial	6	29
Noncommercial	----------	16
Total	6	45
Permits issued from July 1, 1911, to June 30, 1912:		
Commercial—		
Preliminary	----------	29
Final	22	26
Noncommercial	----------	16
Total	22	71
Applications received from July 1, 1911, to June 30, 1912:		
Commercial—		
Preliminary	----------	46
Final	20	25
Noncommercial	3	21
Total	23	92

Much dissatisfaction exists with that provision of the act of February 15, 1901, which authorizes the revocation of permits at the discretion of the Government. It is urged that on account of this clause great difficulty is experienced in obtaining capital for developments, and that when it is secured it is only on terms of most liberal returns to capital. This ground for apprehension should be removed through legislation authorizing term permits, revocable only for breach of the conditions set out in the permit. There seems to be some doubt whether the existing law fully protects a power permittee against a later appropriator of the same land under the mineral or other public-land laws. All doubt on this question should be removed. Land once appropriated for power development should not be subject to any further appropriation which will interfere with the power use.

Stream measurements were made on various national forest streams in cooperation with the Geological Survey. Gauges which had been installed under the direction of the Geological Survey were read regularly by forest officers, who forwarded to the survey the data thus obtained. Unfortunately the survey was unable to continue the work owing to the lack of an appropriation.

OTHER SPECIAL USES.

At the close of the fiscal year there were in effect 13,810 permits authorizing the occupancy of small tracts of forest lands for a variety of purposes. The greater number of these permits are obtained in connection with other uses of forest resources. Thus stockmen obtain them for pastures for stock which can not be allowed to run on the open range, as well as for cabins, corrals, water tanks, and dipping vats used in caring for range stock; agricultural settlers require the use of small areas for irrigating reservoirs and conduits; and lumber operators secure suitable sites for mills and camps. With the construction of new roads and trails the forests are visited more and more for recreation purposes, and in consequence the demand is growing rapidly for sites on which summer camps, cottages, and hotels may be located. In some of the most accessible and desirable localities the land has been divided into suitable lots of from 1 to 5 acres to accommodate as many visitors as possible. The regulations of the department for handling this class of business seem to be entirely satisfactory. Permits are issued promptly and on conditions with which permittees willingly comply.

Some objection is heard to the fact that the permit is revocable in the discretion of the department. If occupancy of lots wanted for summer camps, cottages, and hotels for a period of years could be authorized, more substantial buildings than are now being erected would probably be put up.

PERMANENT IMPROVEMENTS.

The permanent improvement work on the national forests, including cooperative improvements, carried onward the plans which, as explained in previous reports, have been worked out for the orderly equipment of each forest with the facilities demanded for its protection and development. The main effort in 1912 continued to be the pushing forward, to the utmost extent permitted by the funds available, of construction work upon a primary system of trails, telephone lines, and lookout stations which will facilitate protection from fire. The result was to bring the total of construction since this work began up to 13,435 miles of trail, 11,182 miles of telephone line, and 265 lookout stations. There were constructed 190 houses, 186 barns, 328 other buildings, 243 miles of administrative fence, and 53 miles of stock fence.

In cooperation with counties, associations, and individuals there were built 85 miles of road, 153 miles of trail, 219 miles of fire line, 368 miles of telephone line, 65 miles of telegraph line, 32 miles of fence, 33 bridges, 3 corrals, 6 water improvement projects, 7 miles of stock driveway, and 22 stock tanks and dipping vats.

The following table compares the accomplishment in the more important lines of improvement work for 1912 and 1911. In considering the table it must be borne in mind that the appropriation for permanent improvements for the fiscal year 1912 was $500,000 as against $275,000 for 1911. The highest percentages of increased construction were for trails and telephone lines.

Projects.	Number of miles of projects.		Percentage of 1912 increase or decrease in amount done.
	1912	1911	
Trails	3,480	1,383	152
Telephone lines	3,936	1,427	176
Lookout stations	150	91	65
Fire lines	219	163	34
Roads	231	125	84
Bridges	114	50	128
Fences	296	376	—21
Corrals	70	47	49
Water improvement	243	185	31
Houses, barns, and other buildings	704	372	89

The estimated present value of all improvements on the forests, on the basis of what it would cost to replace them, but with allowance for depreciation, is $2,791,308. This is considerably more than the total of all sums ever appropriated by Congress specifically for both construction and maintenance of permanent improvements. A good deal of improvement work was done before provision for it under a separate appropriation clause began; but the chief reason why the value of the property on hand is largely in excess of the sums specifically allotted for this work is the large extent to which the time of rangers and guards is utilized in constructing and maintaining improvements. Thus much of the money which it is necessary to spend for general administration and protection serves at the same time to increase the equipment on the forests.

Every forest supervisor is keenly alive to the great importance of more roads, trails, and other improvements, and is quick to seize every opportunity to employ his men in this work in all free intervals and to combine protective and development work. Men who are watching the forests for fire protection can at the same time be utilized largely in trail building and similar work. As has been explained in earlier reports, carefully prepared plans contemplating the complete equipment of every forest with the facilities needed for its best protection and use are in each supervisor's office. These plans distinguish between the primary and the secondary system, and classify the primary work in the order of importance of the various projects to be undertaken. The primary system is that fundamental to safety and efficiency under existing conditions. The secondary system is supplementary, to provide for intensive development and use. Even the primary system is no more than fairly begun. The immediate needs of the forests call for 80,000 miles more of trails, 40,000 miles more of telephone lines, and many other improvements. It is of the greatest importance that the extension of the system of improvements be urged forward with all speed, and there is no more crying need for larger provision of funds by Congress for national forest work, in the interest of protection and development of a vast property, than that created by this line of activity.

ACQUISITION OF LANDS UNDER THE WEEKS LAW.

The first full year's work under the Weeks law resulted in the general approval for purchase by the National Forest Reservation Commission of 255,822 acres of land. Because of unavoidable delay in executing certain purchase agreements following action by the commission, 30,470 acres of this amount could not be contracted for before June 30, 1912, leaving a net total covered by purchase agreements during the year of 225,352 acres. The lands approved by the commission during the fiscal year 1911, amounting to 31,876 acres, proved not to have title acceptable to the Government. The purchase agreement for this reason failed, and the lands were brought under condemnation. The total area in process of acquisition by purchase or condemnation at the close of the year 1912 was 257,228 acres.

These lands are situated in eight separate purchase areas in New Hampshire, Virginia, Tennessee, North Carolina, and Georgia. In all, 18 such areas have been designated. They comprise 6,383,000 acres, situated in the above-named States and in the States of Maryland, West Virginia, and South Carolina. These areas have been selected on the basis of the topographic maps of the United States Geological Survey and the field work done by the Forest Service in the Appalachian region during the past 12 years. They were selected by the Forest Service, with the approval of the Secretary of Agriculture, and all occupy situations of controlling importance on the watersheds of navigable streams.

The Forest Service has also been authorized by the Secretary of Agriculture to receive offers of land under the Weeks law as well as to examine, appraise, and recommend to the National Forest Reservation Commission for purchase such lands as it believes should be acquired.

It is unnecessary to acquire all of the land within the designated areas. In some probably not more than half of the acreage should ever be recommended for purchase. Many valleys of fertile agricultural lands are included which it would not be wise to acquire. It will probably not be necessary even to acquire all of the mountainous nonagricultural lands within the areas. There is every reason to believe that the purposes of the Government may be fully subserved by the acquisition of compact bodies each containing from 25,000 to 100,000 acres well situated for protection, administration, and use. These bodies may be separated from one another by a distance of from 10 to 25 miles or more. With careful protection from fire and with the introduction of conservative methods of logging they will become demonstrations of practical forest conservation. It will doubtless be practicable to cooperate with surrounding private owners in fire protection and conservative lumbering, and thus in the end to bring most of the Appalachian region to a high state of forest productivity. To bring about this result it may be necessary to designate additional purchase areas, but at this time it does not appear that it will be necessary to acquire more land than the 5,000,000 acres in the Southern Appalachians and 600,000 in the White Mountains, which was stated in the report to Congress by the Secretary of Agriculture in December, 1907, to be all that would need to be acquired.

As a result of the invitation for proposals of lands within the purchase areas 2,102,330 acres have been offered for the consideration of the Government. During the year the Forest Service examined 665,891 acres, all lying within the several purchase areas. With 174,562 acres examined during the preceding year the total area examined prior to June 30, 1912, was 840,453 acres.

Within the purchase areas the selection of the most suitable lands for purchase presents a problem of much importance. It will not do to acquire small scattered tracts, since they can neither be administered nor utilized advantageously. It is necessary first of all to ascertain that a tract of at least 15,000 to 20,000 acres in a body and of the right character of land can be obtained. Other considerations to be kept in mind are the strategic importance of the lands with respect to economy of administration and the protection of the whole watershed, their relative value for timber production and prevention of erosion, their freedom from ownership complications due to defective titles, or mixed ownership on account of alienated water power, timber or mineral rights; and whether the lands can be bought at reasonable prices.

The Secretary of Agriculture announced during the year that no optioned lands would be considered. This action was made necessary by the activities of certain individuals who sought to precede the Government and tie up the desired lands by options in the hope that they might themselves sell them to the Government at a handsome profit. With the refusal absolutely to consider such lands no further trouble of this kind arose.

Lands are appraised as a result of a careful field examination made for the purpose of ascertaining the kinds, quantity, and quality of timber and the character and quality of the soil. Timber values are reckoned on the basis of present cost of operating and market prices, with due allowance for risks and profits. When the Forest Service has determined the value of a tract, negotiations are taken up with the owner for the purpose of obtaining an option at a price not greater than the value of the land as shown by the estimate. The option is usually taken for a period of from three to four months—long enough to give the National Forest Reservation Commission time to consider and act upon the recommendations of the Forest Service for the purchase of the tract. After approval by the commission a purchase agreement is entered into by the Secretary of Agriculture and the vendor.

All lands on which condemnation proceedings have been instituted or which are brought under purchase contract are surveyed by the Forest Service by horizontal measurement and the acreage thus ascertained is used as the basis of payment. In many cases in the Appalachian region lands have never been accurately surveyed, or if they have been surveyed it has been by surface measurement. Frequently the actual acreage found is less than that reported; in some instances the shrinkage amounts to from 8 to 10 per cent. It is impossible to ascertain with great accuracy what liability has been incurred in any purchase until the land has been surveyed and the title has been examined. It will consequently be difficult if not impossible to utilize closely during any fiscal year the funds appropriated for that year. The action taken by Congress to make available until expended the funds yearly appropriated under this act will aid substantially in working out the purposes of the law.

The lands placed under purchase contract or condemnation proceedings during the year are partly cut over, partly more or less culled of their best timber, and partly virgin timberland. The average price is $5.95 per acre, with a range of from $1.16 to $15 per acre.

In the tracts being acquired the Government obtains lands which are believed to be of relatively large influence in the protection and control of navigable streams. Some are highly valuable for timber production; others are less so on account of the burned and impoverished condition of the soil; but all of them are so situated as to be of great value as demonstrations of forest conservation. The educational value of these lands in some instances will, it is believed, be as important a consideration as any other, since they will set up a sharp contrast in the several localities between a Government forest systematically cared for, developed, and utilized and forests heedlessly cut over, burned, and neglected.

Congress has appropriated funds for the protection and administration of all lands acquired. They will be put under systematic management with the object of improving their regulative effect upon streamflow and of increasing their products for use.

STATE AND PRIVATE COOPERATION.

Work in cooperation with States and private timberland owners comprised cooperation with States in fire protection under the Weeks law, field investigations in cooperation with States, and field studies and a small number of examinations of timber tracts to furnish the basis for advice to owners concerning better methods of management.

COOPERATION WITH STATES.

Cooperation with States in protecting the forested watersheds from fire was continued under the provisions of section 2 of the Weeks law, which appropriated $200,000 for the work. Almost two fire seasons have passed since the law went into effect.

Watersheds protected include such as the Penobscot, Kennebec, Connecticut, Merrimac, Hudson, Delaware, and Potomac, in the Northeast; the Mississippi, in Wisconsin and Minnesota; and the Columbia and Willamette, in the Pacific Northwest.

The effectiveness of patrol and other protective features has been demonstrated by the small area within these watersheds burned over in the fire season of 1911, which scarcely exceeded 250,000 acres, as contrasted with enormous losses in some States in previous years.

The States are by no means equipped to handle the forest-fire problem alone, and where navigability of streams may be affected the Federal Government may well lend its aid. Many difficulties arise in connection with the handling of this problem by the States which are not encountered on the national forests because of the uniform ownership and policy obtained under Federal administration. In other than public-land States nearly all forest lands, especially in the States east of the Mississippi River, are held by private individuals. The average private owner is surprisingly indifferent to the need or value of forest-fire protection, particularly on cut-over lands. Even where this appreciation is not wholly lacking there is often an unwillingness to cooperate with other owners or with the State.

There is an exceedingly close relation between this cooperative protection and the protection given the national forests and the areas purchased under the Weeks law. Wherever possible the former supplements the latter, thus lessening in a large measure the danger of fire reaching the forests or purchase areas from outside.

It has been the purpose of the Forest Service in the allotment of the fund provided under the Weeks law to secure the greatest educational benefits by promoting State and private protective work in as many different States as possible. In the furtherance of this policy the maximum allotment made to any State has been limited to $10,000. Allotments in each case are based upon the number and importance of navigable watersheds, placing a broad interpretation upon the term "navigable" and using as a general basis of determination the reports of the Chief of Engineers of the United States Army; the extent and value of the forests; the amount of the State appropriation and the ability of the State itself to do the protective work needed; and the amount of cooperation which can be secured from private owners.

In all cases a reasonable effort on the part of private owners is required. The provision of the law that cooperation shall not be extended to any State which has not provided by law for a system of fire protection has been interpreted and applied as requiring a field protective organization. States depending upon volunteer protection or upon the services of ex officio wardens with optional county expenditures have not received allotments. State appropriation for the protection of navigable watersheds equal to Federal expenditures by fiscal years has been required.

The following statement shows the allotment by States for the calendar years 1912 and 1911 and the expenditures during 1911. The unallotted balance of the $200,000 fund available on September 1, 1912, was $83,706.45.

State.	Calendar year 1912, allotment.	Calendar year 1911.		
		Allotment.	Expenditures.	Unexpended balance.
Maine	$10,000.00	$10,000.00	$9,991.80	$8.20
New Hampshire	8,000.00	7,200.00	6,219.50	980.50
Vermont	2,000.00	2,000.00	1,218.00	782.00
Massachusetts	2,500.00	1,800.00	365.00	1,435.00
Connecticut	1,500.00	1,000.00	6.00	994.00
New York	4,000.00	2,000.00	2,000.00	
New Jersey	2,000.00	1,000.00	990.00	10.00
Maryland	2,000.00	600.00	261.00	339.00
Wisconsin	5,000.00	5,000.00	4,437.25	562.75
Minnesota	10,000.00	10,000.00	10,000.00	
Oregon	10,000.00	5,000.00	3,305.00	1,695.00
Washington	10,000.00			
Montana [1]	3,500.00			
Idaho [1]	[2] 7,000.00			
Total	77,500.00	45,600.00	38,793.55	6,806.45

[1] Agreements not executed because of a favorable fire season.

[2] The expenditure of $3,000 is conditioned upon the State's extending its present organization.

Cooperation has also been considered with Kentucky, Alabama, and California. At the last session of the Kentucky Legislature a forest law was passed which provided for a forest fire-protective system and made an appropriation for its maintenance. A tentative allotment of $4,000 was set aside and will be made available as soon as the State can organize its forest force. It was found necessary to postpone cooperation with both Alabama and California because in neither of these States was there in operation an adequate State fire-protective system, nor were there funds to permit of systems being organized under present laws. The Forest Service has desired to extend cooperation to many other States, but has been prevented from doing so by their failure to meet the requirements.

To insure the efficient expenditure of the funds allotted, each State, before the beginning of the fire season, has been required to submit a protective plan showing the watersheds to be protected, and in detail the part to be taken by States and private owners and the manner in which Federal funds are to be used to supplement or complete the system of the State and private owners. As rapidly as necessary permanent improvements and other conditions will allow, the expenditure of Federal funds is being restricted to the employment of patrolmen or lookout watchmen. This plan increases the effectiveness of the work and simplifies field inspection, auditing, and accounting. The service is manning lookout points as rapidly as they are located and equipped by the States.

So far as men are available, the protective work within each State is inspected annually. The results and conclusions secured from such inspection are furnished to the State authorities. The intensive study of all State organizations during the year makes it possible to acquaint each State with the best methods which have been developed in all others. Authority is reserved by the Government to cancel cooperation where inefficient work is found, or to terminate the services of inefficient men. As rapidly as practicable, railroad patrol by Federal patrolmen is to be restricted, since such patrol is held to be properly the duty of the railroad companies. State foresters are urged and required to secure the maximum of assistance from railroad companies. During favorable seasons, when it is possible to reduce the number of patrolmen and accordingly the expenditures for fire protection, States are required to reduce Federal and State expenditures proportionately.

To insure exactness in the method of expenditures and to prevent misunderstanding as to the condition governing cooperation, the work in each State for each year is covered by a cooperative agreement between the Secretary of Agriculture and a State official. To supplement the inspection of Federal officers, to give the fullest possible opportunity of understanding the plan followed by the State, and to insure the adoption during succeeding years of all improved methods of protection, a full report on results secured is called for from each State at the end of the fire season.

The benefits already derived from expenditures under this act can not be overestimated. Greater interest in fire protection has been stimulated in all the cooperating States. This is shown in the enactment of better laws, in appropriations, and in much more efficient fire protection. The educational value of the work is very great because of the close contract of Federal and State patrolmen with the people. During the year 1911 alone Federal patrolmen in New Hampshire were able to warn 4,200 people against carelessness in the use of camp fires.

In general, cooperation with the States has resulted in more efficient protective systems, in permanent organizations which make use of lookouts and telephones for the prompt discovery of and quick communication regarding fires, and in the abandonment of old, inefficient methods of voluntary service, and services by ex officio wardens, and uncertain action by counties and municipalities.

The requirement that in addition to State appropriations and a State fire system individual timberland owners cooperate with the Federal Government and the State has resulted in much closer relations between the States and private owners, and greatly increased expenditures for fire protection, both for the services of patrolmen and lookouts and for the construction of permanent improvements, such as lookout stations, telephones, trails, and similar advantages.

The cooperation with the State of New Hampshire furnishes a good example of the relative expenditures developed under the act. Over the entire State the Federal Government expended $6,219.50, the New Hampshire Timberland Owners' Association $8,800, and the State $13,486.01. In the northern district of New Hampshire, with an area of approximately 1,000,000 acres, a total of $14,000 was expended, an average rate of something less than 1.5 cents an acre.

The appropriation has resulted in great benefits in conservation of forest resources. On the average every dollar expended by the Federal Government has resulted in an expenditure of at least $2 or more by the State and private owner, and the ratio will increase as the benefits of protection are more clearly realized. It is of great importance that the appropriation for cooperation with the States in fire protection be continued. The present appropriation will be exhausted by January 1, 1914. An additional appropriation of $200,000 to be available until spent, so that the work may be continued without break, is urgently needed.

A study of forest conditions in Porto Rico was made at the request of the insular Government. This was coordinated with the work initiated on the Luquillo National Forest. The Luquillo National Forest was created primarily because of its importance to the surrounding territory as a water protective area, to insure the production of a perpetual supply of wood, and to encourage private owners and the local government by example to take up work in forestry. The population of the area surrounding the forest is very dense and the demand for wood, which at the present time is supplied largely by imports, is correspondingly great. As a result of the study it is proposed first that a survey shall be made of the forest in order to settle finally the title to a considerable part of the land about the ownership of which there is now much doubt. It is believed that this survey will show that the Federal Government owns an area of at least 20,000 acres; and the insular Government has expressed its willingness to convey to the Federal Government as an addition to the forest the adjacent areas which it owns. If these surveys show, as they undoubtedly will, that an area exceeding 20,000 acres can be held, a forest administration will be established and permanent improvements begun in order to make available for use the timber which at the present time is largely or altogether inaccessible.

Immediately following a field study of the entire island a concise preliminary report concerning the forest problems, with suggestions as to methods of handling them, was prepared for the immediate use of the board of commissioners of agriculture in their recommendations to the Legislative Assembly. Extensive forest planting must form a large part of any operations of the insular

Government on account of the small area in forests. Little is known of the native species or of the adaptability of exotic species except for ornamental planting. A large amount of systematic experimental work will consequently be necessary to determine what species are suitable for commercial forest planting. The chief recommendation of the preliminary report concerned legislation providing preferably for the creation and maintenance of a forest experiment station, a technical forest director, and an initial appropriation of $18,000, or for a smaller appropriation covering the salary of a forester and his necessary office and incidental expenses as a means of carrying on preliminary advisory and publicity work. While the board of commissioners of agriculture as a result of these recommendations included in its budget to the 1912 legislature, then in session, an item of $18,000 for forestry use, it failed to receive the approval of the committee on finance.

The preliminary report has been published by the board of commissioners of agriculture. A final and much more complete report is being prepared.

A preliminary examination of the forest conditions in Louisiana, the results of which were prepared for publication during the year, showed the principal forest problems to be those resulting from overproduction of lumber, forest fires, grazing, taxation, and turpentining. Suggestions were made for the development of an adequate forest fire protection system, more rational lumbering methods, both on the large holdings and farm woodlots, forest planting, and the conservative management of State lands. Considerable legislation has resulted, but, without appropriations, is inoperative. The constitutionality of the timber-tax provision of one of the latest acts designed to produce funds for work in forestry is now being tested in the courts.

As a result of a cooperative study begun in the summer of 1907 with Kentucky, and continued in 1908 and 1909, an appropriation was made and a forest law was enacted at the last session of the legislature providing for the employment of a State forester, the establishment of a forest fire protective system, and the acquisition and administration of State forests.

A study made in Florida in 1909 in cooperation with the State resulted during the year in the introduction of a bill in the State legislature to establish a State forest organization. Cooperative studies of loblolly pine in North Carolina and yellow poplar in Tennessee were completed.

The compilation of State forest land and fire laws has now been completed for 37 States and practically completed for 3 additional States. The purpose of this compilation is to keep the Forest Service in close touch with existing State forest legislation and to place it in a position to give advice and to further to the utmost the development of forest legislation within the States. Within the year material assistance of this kind was furnished to the State of Alabama.

A tax study in cooperation with the State of Washington was completed and efforts were made to secure its publication either by the State or by a private association. This, it is hoped, can be accomplished shortly.

COOPERATION WITH PRIVATE OWNERS.

The remarkable development of State forestry in the East and the increase in the number of private foresters has made it possible to restrict the scope of Federal cooperation when individual owners may obtain assistance from these sources. To make certain that the entire field is covered agreements concerning the part of the work which will be covered by the Federal Government and the part by the State organizations have been reached with Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, North Carolina, Georgia, Indiana, Michigan, Wisconsin, Minnesota, Missouri, Ohio, Washington, California, Idaho, Nevada, Colorado, Nebraska, and Kansas. Applications for assistance and inquiries from these States are now referred to the State organization for necessary field examinations and detailed information. The service merely forwards available publications.

In States where field examinations are still made by the service because of the absence of any State agency prepared to handle the work, examinations have been mainly restricted to small holdings. Owners of larger tracts are generally referred to private or consulting foresters. For the sake of economy as well as to render the work of the largest educational value, the service endeavors to make several examinations in a locality at the same time. The reduction in this work makes it possible to devote more attention to an exceedingly important phase of cooperative work. It is believed that the maximum results can be secured with the least expenditures by issuing a series of regional publications giving detailed advice on woodlot management and forestation for the prevailing types of forests in the principal regions of the eastern United States. Several publications of this character are already available, and others are proposed. They will be of decided value to private owners for direct application in the management of their woodlands, as well as to State organizations and to consulting foresters.

There were made 13 woodland examinations for private owners, covering in all an area of 44,334 acres. Excluding three large tracts with a total area exceeding 42,000 acres, for which the examinations were arranged prior to the adoption of the policy not to examine large tracts, the average area of the tracts examined was 218.7 acres. For one large tract of approximately 40,000 acres in the mountains of Virginia and West Virginia the owner desired advice concerning the best method of fire protection. Nine of the tracts are located in Virginia and West Virginia, neither of which has a forestry department.

OTHER INVESTIGATIONS.

SILVICULTURAL AND DENDROLOGICAL STUDIES.

During the year commercial tree studies, covering the growth, volume, and yield of the tree, its utilization and life history, and the best methods of management to secure natural or artificial reproduction, were completed for balsam fir, cottonwood, second-growth yellow poplar, ashes, willows, loblolly pine in North Carolina, and eastern white pine. Similar studies of five other species are nearing completion. Besides their future usefulness in the management of National

Forests in the East, these studies are of immediate value to State foresters and to private owners of timberlands and wood lots.

Silvicultural studies necessarily involve the collection of a large number of field data and tree measurements. Aside from their use in the particular study for which they are gathered, these data and measurements, taken together, furnish material with which it is possible to establish laws and relationships of tree growth of the greatest value to those having to do with the study or management of timberlands. During the year 18,500 forest measurements and data were worked into 32 volume, 6 yield, 10 growth, and 430 stand tables, as well as into miscellaneous tables of other kinds. In answer to inquiries from lumbermen and other timberland owners, State and private foresters, and forest officers, 11,016 such tables were given out.

A study made of the results of forest planting by private owners in the northeastern States yielded valuable data on the amount of planting that has been done, methods followed, cost, and rate of growth and yield of the different species planted. On the poorer farm lands of the region forest planting is on the increase, and is being given considerable impetus by State aid. The movement is particularly noticeable in those States which contain, in the aggregate, large areas unsuitable for agriculture.

From data furnished for several years by volunteer observers throughout the country a tree calendar was prepared showing the time of leafing, ripening of fruit, falling of fruit, and falling of leaves for 60 species, including native trees and a few of the common exotics.

The investigations in basket-willow culture were further developed during the year. Experiments with both native and exotic willows at the Arlington farm of the Department of Agriculture produced several heretofore unknown varieties of exceptional promise. A part of the experimental work was transferred to Ames, Iowa, since it was found that Arlington was too far south for the best development of many of the native species. The first of a series of experiments in protecting river banks and lake shores from erosion by planting basket willows was begun on the shore of Lake Erie. Here the production of basket willows will be secondary to that of protecting valuable land from wave action. As in former years, willow cuttings from the Arlington farm were distributed to applicants, with advice concerning the best cultural methods. Approximately 80,500 cuttings were sent out, of which 20,000 went to agricultural experiment stations, 4,500 to forest schools, 5,500 to Forest Service nurseries, 30,000 for use in cooperative work in New Jersey, and 20,500 to individuals in 32 different States.

Dendrological studies of the distinguishing structural characteristics of important native trees, and of foreign woods for which inferior substitutes are likely to be placed upon the American market, yielded material on North American walnut and sycamore woods, Circassian walnut, and greenheart, which has been prepared for publication. Similar studies of North American pine and elm woods, true mahogany, rattan, and sandalwood were begun. In addition, monographs were prepared on the structural characteristics of balsam fir, red pine, and jack pine woods for use in silvicultural publications dealing with these species.

During the year a study was made of the pith-ray flecks, or medullary spots, which occur in many native woods. These are caused by the larvæ of an insect which live in the cambium during the growing season, and discolor the wood, often rendering it unfit for certain uses. The study dealt with the kinds of trees affected, the means by which the larvæ obtain entrance to the cambium, the geographical distribution of the insect and the factors affecting the local distribution of larvæ and mines, and the deteriorative effect on the wood.

Hand collections of the chief commercial woods of North America were prepared for the use of schools and of branches of the Forest Service needing such material. In cooperation with the Bureau of Plant Industry, 100 important Panama woods were described and illustrated for a proposed publication dealing with the trees and woods of the Isthmus. A catalogue of national forest flora was prepared, showing on which national forests certain species occur. The study of the effect of shade on hardiness of coniferous seedlings, begun in 1911, was continued. As in former years, a number of wood samples submitted by manufacturers and other wood users were identified.

STUDIES OF FOREST PRODUCTS.

Work in forest products during 1912 was of broader scope, greater volume, and productive of more important results than in any previous year.

STRENGTH TESTS.

The work of testing woods grown in the United States as a means of assisting users to select the species best adapted to a given purpose or to find substitutes for species becoming difficult to obtain was actively carried forward. During the year 23,882 tests were made on 35 species of wood. By the systematization of this work the cost of making tests has been steadily reduced, until now it amounts for each test to approximately 50 cents, or about half the cost prior to the establishment of the Forest Products Laboratory. The tests will be continued until all species of commercial importance growing in the United States have been covered.

The work in connection with structural timbers was confined during the year mainly to analyses of test data previously obtained for longleaf, shortleaf, and loblolly pine, Douglas fir, western hemlock, western larch, Norway pine, tamarack, and red spruce. One important result was to show that many of the defects which have been the basis of culling timbers do not seriously affect their value for structural purposes. Another fact brought out is that western hemlock, generally considered an inferior timber, is entitled to a place among the important western woods. Green western hemlock stringers showed an average strength 88 per cent as great as that of Douglas fir, one of the chief construction timbers of the United States. Western larch, another little-used wood, showed a strength 81.7 per cent of that of Douglas fir. Besides determining the relative mechanical properties of the different woods, the results of these tests permit the formulation of grading rules that classify timbers according to strength. Tests were started on western yellow-pine car sills and floor beams and were completed on that portion of the material tested green. This series will conclude the tests on important structural woods of the Pacific Northwest.

Tests were made on standard 6-foot, 6-pin cross arms, divided into seven groups, as follows: Douglas fir; shortleaf pine, natural and creosoted; longleaf pine, 50, 75, and 100 per cent heart; and southern white cedar. Users of cross arms have been demanding the better grades and stronger kinds of timber. The tests indicate that for arms of the dimensions of those tested less consideration need be given to initial strength, and therefore a greater latitude can be exercised in the choice of woods.

The heavy loss incurred through damage to freight in transit has turned the attention of railways and shippers to the better construction of wooden containers. Tests of nailed, wire-bound, and dovetailed packing boxes were undertaken in cooperation with the bureau for the safe transportation of explosives and other dangerous articles. The results of the tests were especially favorable to the wire-bound boxes. A practical effect of the tests has been the modification of regulations of the Interstate Commerce Commission and of specifications of the Navy Department in regard to boxes used for the transportation of explosives.

Throughout the Rocky Mountain region of Wyoming, Montana, and Colorado western red cedar, imported from Idaho, has been the chief wood used for poles. These three States, however, contain much fire-killed lodgepole pine and Engelmann spruce. To secure data on which a comparison of strength might be based, tests were made on the Idaho cedar and on the Rocky Mountain woods. Most of these were completed the previous year, but the work was extended to include air-seasoned lodgepole pine poles cut from green material. The results of the tests show that both the spruce and pine, when properly treated with preservatives, are suitable for poles. Their use for this purpose will lessen the cost of constructing telephone lines throughout a wide region.

The effect of preservative treatments on the strength of timber has never been fully determined. Strength tests of stringers treated with creosote by commercial processes have been in progress several years. When the tests on Douglas fir, treated by the boiling process, showed a decided weakening of the timber, it was thought probable that the strength would be restored by seasoning. This, however, did not prove to be the case. Air-seasoned (treated) stringers showed a strength very little above that of the treated stringers tested without seasoning. Small specimens will be treated and tested to determine what part of the treating process is responsible for the loss of strength, whether other species treated by the same process show the same loss, and whether Douglas fir treated with creosote by other processes is affected similarly to that treated by the boiling process.

PHYSICAL PROPERTIES AND STRUCTURE OF WOOD.

In connection with the study of structural qualities of the various woods, described in my last report, more than 650 permanent microscopic slides, representing 100 different species, were prepared during the year. A special study of the occurrence and significance of tyloses in wood was completed, and shows that these have an important bearing upon the absorption of preservatives.

A study was made of a number of different species to determine the specific gravity of the actual wood substance. Results obtained thus far show it to be from 1.5 to 1.6, the variation among species being comparatively small. There are indications, however, that it may be influenced by certain treatments.

In the tests to determine the specific heat of wood, the chief results of which were mentioned last year, a decided rise in temperature with the absorption of water by the wood was indicated, and other tests will be made to determine the extent and significance of this.

The study of physical properties is not confined to the projects just described. Information on such properties as specific gravity of the oven-dry wood and shrinkage was obtained in connection with the strength tests; transmission of moisture from the wood was necessarily taken into account in kiln-drying experiments, while special studies of the transmission of heat and pressure and of the permeability of woods were carried on in connection with wood-perservation work.

DRYING OF WOOD.

A new type of kiln, invented by Mr. H. D. Tiemann, a member of the laboratory staff, has proved a success experimentally, and two patents covering the principles of its operation were received in March. These patents were dedicated to the public. The efficiency of the method in commercial practice has been tested at Berkeley, Cal., and at the Madison laboratory. The kiln at Berkeley has been used to dry eucalyptus lumber. It was operated during the fall and winter with blue gum (*Eucalyptus globulus*) and manna gum (*Eucalyptus viminalis*), and worked admirably. A small number of excellent boards were turned out, the material having been dried from the green condition with practically no checking or honeycombing, a thing which so far as known has never before been accomplished. The practical impossibility, however, of obtaining green lumber from young trees which is neither warped, checked, nor curled makes it very doubtful whether trees of these two species under 30 or 40 years of age, such as constitute the greatest part of the present stand of eucalyptus in California, can profitably be converted into high-grade lumber. It seems probable, however, that other eucalypts of slower growth may produce valuable lumber in from 30 to 40 years, and experiments will be made with several of them if trees can be found sufficiently mature for the purpose.

The kiln at Madison is a small wooden one. A number of runs have been made with green wagon stock, chiefly of swamp-grown red and white oaks, and birch, with results that indicate a great possible saving over present practice by elimination of checking and reduction of the time required for drying. A third kiln, at Cairo, Ill., will be used for drying hickory vehicle stock.

A study of the drying of lumber at atmospheric pressure, carried on in the experimental kiln described last year, brought out the need in kiln operation for accurate control of humidity and temperature, combined with a large amount of air circulation. In connection with this study a humidity diagram was prepared for the use of dry-kiln operators in determining all conditions of humidity within the kiln. A field study of commercial practice in the kiln drying of Douglas fir and other northwest woods was made during the year.

WOOD PRESERVATION.

Studies made during the year in wood preservation dealt with (1) the preservative; (2) the wood, its penetrability and resistance to decay; and (3) methods of injection.

Results secured in an experiment with mine timbers in actual service showed that while untreated gangway sets have an average life of only from 1 to 2 years, the same timbers, when brush treated with coal tar, will last from 3 to 4 years, and when impregnated with zinc-chloride solution, or creosote, are, as a rule, entirely sound at the end of 4 years. Inspections made during the year of 8 test tracks, laid at various times since 1902 with treated and untreated ties, showed that with one exception all the treatments used have increased the durability of the ties over that of similar untreated material. The test tracks have not been in service long enough to permit of definite conclusions as to just how much the natural life of ties can be prolonged by treatment, but that it may in many cases be doubled, or even trebled, seems certain. Untreated loblolly pine and hemlock ties laid in Texas lasted only 1.5 years, while of those treated by the Burnett process over 70 per cent are still serviceable after 7 years.

Many new preservatives are either being proposed or marketed. A number of such preservatives were tested during the year, and their physical, chemical, and fungicidal properties, their penetrative qualities, and the inflammability of wood treated with them determined. While many gave little evidence of usefulness, a few were found which promise to be of value either in reducing the cost of treatment or in increasing its efficiency.

To determine by a quick method the comparative efficiency of various preservatives in preventing the growth of fungi, tests were made with pure cultures of fungi in specially prepared cultural media. Results so far secured are of special interest in showing for any given preservative the proportion necessary to prevent the growth of fungi.

Creosotes derived from different sources, or from tars produced by different methods or at different temperatures, vary in their physical and chemical properties and in their efficiency as wood preservatives. To study the extent of this variation, an examination of authentic samples of tars collected from various sources was begun. The work involves a great number of precise determinations, and probably another year will elapse before final results are obtained. These are expected to afford a rational basis for classifying creosotes in accordance with their chemical and physical properties.

The study of the relative efficiency of creosote fractions, begun last year, was continued and extended. The tests now comprise determinations of the efficiency of the various fractions in preventing attack by marine organisms, in preventing decay, and in preventing the absorption of water by paving blocks. A second set of pile sections, treated with lesser amounts of the various fractions than those placed the previous year, were set in the Gulf of Mexico and in San Francisco Bay. Data on the volatilization of various fractions of creosote after their injection into wood, secured in connection with this experiment, indicate that the creosote, to be of most value, at least for loblolly pine, should contain considerable quantities of high boiling fractions, which appear to plug up the outer cells and so insure the retention of the lighter oils in the interior of the wood. In the paving-block tests preliminary results throw an interesting light on the relative efficiency of "heavy" and "light" oils in treating this class of material.

A perplexing problem in connection with the preservative treatment of ties is how to obtain a uniform treatment of all ties in any one cylinder charge. To accomplish this it is essential that only timbers which present the same degree of resistance to penetration be treated together. Tests to establish a scale of penetrability have been completed on a large number of coniferous woods and the results are now being analyzed. The work will be continued on woods of the broadleaf trees.

To determine the relative resistance of various untreated woods to decay, specimens were subjected to pure cultures of fungi in jars. The tests have not been under way long enough to give definite results.

To find a preservative treatment for poles used in the construction of telephone lines upon national forests which can be applied locally and at small cost, preliminary tests with the Boucherie process, which has been successfully used in Europe, were made on several national forests in California. This process consists, briefly, of impregnating freshly cut poles with a solution of copper sulphate, aided by the osmotic action of the wood cells. Experiments already made have been very encouraging, and more extensive ones have been undertaken. If the process is found to be feasible for this country it should find extensive use by commercial companies, especially in the more remote regions.

A series of tests to determine an economical method for treating paving blocks of Douglas fir and western hemlock, undertaken in cooperation with the University of Washington, showed that a cheap and efficient treatment can be obtained by the open-tank process. Preliminary tests on western larch blocks indicate that this species is adapted to the same method of treatment.

Experimental treatment of a large number of red oak and hard maple cross-ties, to determine the relative efficiency of different processes, was completed at the close of last year. The treated ties, together with a number of untreated ones—about 1,700 in all—have been laid in a test track of the Chicago, Milwaukee & St. Paul Railway Co., in cooperation with which the work was undertaken. Inspections of the test track will be made at least once each year to determine the condition of the ties in respect to decay and rail wear.

Exact knowledge concerning the preliminary vacuum or pressure, the rate at which heat is transmitted to the interior of the wood from the surrounding medium, and the manner in which a liquid permeates wood must be had before any real advance in methods of impregnating woods can be expected. Studies were therefore made during the year of the rate at which air pressure or vacuum is transmitted through wood and the effect of preliminary vacuum or pressure upon absorption and penetration of the preservative, the recovery of the preservative after injection, and the loss after treatment by dripping and volatilization. Other studies dealt with the relation of certain structural features, such as tyloses, resin canals, and bordered pits, to permeability of the wood.

The treating plant of the Oregon Agricultural College was operated by a service representative for a week during a special short course, and the service assisted in the installation of a small open-tank plant for the University of Colorado.

WOOD DISTILLATION.

The results of studies dealing with the analysis, refining, and composition of wood turpentines, concluded during the year, may be summarized briefly as: (1) A new distillation method by which more complete and accurate conclusions in regard to the composition of a turpentine can be drawn than is possible with former methods of equal simplicity; (2) refining of five samples of crude wood turpentines produced by different commercial processes, and the description of methods of refining applicable to wood turpentines of a wide range in composition; (3) data which show how the composition of wood turpentines is influenced by different methods of production, by refining, by storage, and how wood turpentines compare with gum turpentines in composition; and (4) the presentation in specific form for the first time of the differences in composition between gum and wood turpentines, and between different samples of wood turpentines, and the reasons therefor.

Experiments on the steam extraction of volatile oils from resinous woods were completed. The effect of size of chip, steam pressure, and speed of distillation on the yield of oil and efficiency of the process were determined. With a knowledge of the various factors of cost at any steam distillation plant it will be possible from the results of the experiments to decide readily on the most economical conditions for conducting distillation.

Attempts to distill commercially resinous woods of the Northwest, particularly Douglas fir, have not proved entirely successful. At the beginning of the year the Forest Service entered into an agreement with the University of Washington by which cooperative experiments will be carried on to determine the best methods of distillation and refining, the distillation methods applicable to Douglas fir and other woods of the Northwest, the yield of distillates from the various species, and the possibilities of their commercial use. Some work has already been done, but no definite results have as yet been secured.

The hardwood distillation industry has operated upon beech, birch, and maple almost exclusively. Experiments were undertaken to determine the comparative yield of valuable products of a number of other species. As compared with average yields per cord of 8.6, 11.4, and 11.7 gallons of wood alcohol, respectively, for birch, beech, and maple, chestnut yielded 3.6, red gum 9.2, oak 9.2, and hickory 15.3 gallons. In acetate of lime, as compared with average yields per cord of 349, 318, and 292 pounds, respectively, for birch, beech, and maple, chestnut yielded 195, red gum 258, oak 300, and hickory 338 pounds.

Because it seemed probable that a larger yield of valuable distillation products than is now obtained by commercial plants could be secured, a study of methods of distillation has been planned. Very little experimental work has as yet been done, though incidentally, in the determinations of yields from various species, the yield of acetic acid was found to be about 50 per cent greater than that obtained commercially. The reason for this increased yield is not yet known.

With a view to reducing the cost of hardwood distillation, and at the same time extracting more refined products, the effect of repeated distillations of alcohol with and without alkalies and the neutralization of acetic acid with some agent less caustic than calcium oxide were studied. It appears that the acid vapor may be treated with calcium carbonate in such a manner as to secure a calcium acetate of a high degree of refinement, and at the same time separate the alcohol liquors in one distillation, instead of in two, as heretofore required.

Extraction experiments are being made on the leaves of various conifers of the Pacific coast. The yields of commercially valuable oil thus far secured, however, are so small that it is doubtful whether the extraction can be conducted profitably by a commercial plant. Experiments will be continued until more definite results are obtained.

One of the most promising means for profitably utilizing wood waste is the production of ethyl alcohol. To ascertain whether the production of ethyl alcohol from sawdust is commercially feasible, and, if so, what are the best methods of procedure, apparatus is being installed at the laboratory for conducting experiments on a large scale.

NAVAL STORES.

Experiments in the tapping of western species for the production of naval stores, begun in 1910, were continued on a more extensive scale. During the turpentine season of 1911 systematic experiments were conducted on western yellow pine in Arizona, and on both western yellow pine and piñon pine in Colorado. The flow from digger and Jeffrey pine in California is being studied the present season. The results of the Arizona and Colorado experiments were described last year. Since then oleoresins obtained from the various species in the tapping experiments have been subjected to a thorough analysis. Of the oils examined, that from western yellow pine from Arizona conforms most nearly to ordinary turpentine, and it is likely that both the California and Arizona oils will serve the purposes for which ordinary turpentine is commonly used.

WOOD PULP AND PAPER.

Results from experiments with jack pine and hemlock for ground wood pulp, begun last year, have demonstrated conclusively that these two woods can be made into the cheaper grades of paper by practically the same methods used in grinding spruce pulp. Since the results of the tests have become known at least one mill has begun grinding these woods. A number of other species which are available for use as pulp wood are now being studied.

Practice among mills manufacturing ground wood pulp differs widely, even when the same species of wood are used and the same products turned out. With this in mind, a thorough study was made of the effects of the condition of the surface of the pulp stone, the pressure with which wood is forced upon the stone, the temperature of grinding, and the physical condition of the wood upon the resultant factors of the horsepower which must be applied to the grinder, the amount of pulp produced in 24 hours, the horsepower consumption per ton of pulp, and the yield and quality of the pulp. The results should be of great value to the industry in establishing standards of practice, increasing the efficiency of grinding, and reducing the cost of operation.

The effect of steaming or boiling wood previous to grinding was determined in part during the year. It was found that such treatment produces a pulp of greatly increased strength, though of a darker color. It is possible that woods not suitable for grinding in their natural state may be rendered suitable by some preliminary treatment, and that the ground wood pulp thus obtained can be used for tough wrapping papers which now require chemical pulps.

In the tests to determine the relative suitability of various species for the production of soda and sulphite pulps, redwood, redwood bark, red fir (*Abies magnifica*), lodgepole pine, and sand pine were studied. In addition, a small quanity of mill waste from Mexico (consisting mostly of *Pinus ponderosa*) was tested at the request of the State Department. The yields from the best cooks of these materials ranged, in the soda process, from 34.9 per cent for redwood bark to 51.7 for the mill waste, and in the sulphite process from 33 per cent for redwood bark to 47.8 per cent for sand pine.

The general effect of the work with soda and sulphite pulps from the various woods is seen in the increasing use by pulp mills of species which a few years ago were not thought suitable for the commercial manufacture of paper pulp.

There is reason to believe that the efficiency of commercial practice, as well as of experimental work by the service, may be increased by a knowledge of the relation of the fundamental cooking conditions in pulp manufacture. The effects of the variable cooking conditions—proportion of caustic soda to weight of wood, causticity of cooking liquor, and temperature and duration of cooking—in the production of soda pulp have been studied, and the relation of these factors to the yield of crude and screened pulps, the consumption of chemicals, and the quality of the resultant pulps determined. Similar experiments have been begun with the sulphite and sulphate processes, using several species of wood.

WOOD UTILIZATION.

Douglas fir, probably the most important timber tree of the Northwest, has often been a prey to forest fires, which have left immense quantities of dead standing timber. A study of such timber, made to determine its rate of deterioration, usability, and strength, was completed during the year. It showed that fire-killed trees under 3 feet in diameter usually remain merchantable for 8 or 10 years, while larger trees with thin sapwood may remain merchantable for 15 or 20 years. The strength of the dead timber was found to be but slightly below that of green material, thus indicating that the sound wood from fire-killed trees may safely be used for general construction purposes.

A study of the production and consumption of the paper products in the Pacific Northwest was completed. The results should prove of assistance to the Forest Service and to private timberland owners in the disposal of certain species of trees not in demand for lumber.

Western red cedar supplies the material for 65 per cent of the shingles produced in the United States. The manufacture of such shingles is confined almost entirely to the State of Washington, where it forms a very important industry. A study of this industry, begun in 1911, was completed during this year.

Another study dealt with the industries which use the products of wood distillation, especial attention being given to the proportion of the products used by each.

The cooperative work between the Forest Service and the Bureau of the Census in collecting and compiling statistics of forest products of the United States was continued during the year. The statistics gathered annually now cover lumber, lath, shingles, crossties, pulp wood, slack and tight cooperage, veneer, poles, cross arms, brackets, insulator pins, excelsior, and wood distillation, while figures for consumption of tanbark and tanning extract, turpentine and rosin, and mine timbers are secured every five years. In addition, statistics relating to wood preservation are gathered annually by the Forest Service.

Wholesale lumber prices, f. o. b. market and f. o. b. mill, were collected and issued quarterly, as in the previous year. These furnish a continuous and permanent record of the rise and fall of lumber values.

Wood-using industry studies, which show the kinds and amount of wood required by the various industries, the purposes for which the different species are employed, and the extent of their use, were completed in Alabama, Arkansas, California, Illinois, Louisiana, Michigan, Mississippi, Missouri, Tennessee, Texas, and Washington. Field work was completed for similar studies in Connecticut, Florida, Georgia, Idaho, Iowa, Kansas, Maine, Minnesota, Montana, Nebraska, New Hampshire, North Dakota, Oklahoma, Rhode Island, South Dakota, Vermont, and Virginia. When all States have been covered it is planned to issue the results in two series of publications—one to give the uses to which the important commercial woods of the United States are put, the other to discuss the requirements and the methods of manufacture employed by the wood-using industries.

MISCELLANEOUS.

During the year the Forest Service issued 44 new publications as against 31 the year before. Revisions of three older publications were also issued. The total number of Forest Service publications distributed was 359,129 as compared with 245,500 in the previous year. Most of the bulletins and circulars were of a technical character, presenting the results of investigative work. Besides the publications issued there were 17 new bulletins and circulars in press at the end of the year.

One thousand and fifty-four books and pamphlets, most of them free publications received either directly by the Forest Service or through the library of the department, were added to the library of the Washington office, bringing the total number of volumes there up to 16,017. Sixty forest and trade journals, about half of which are secured free and half purchased by the department, are regularly received at Washington.

There were added to libraries maintained in supervisors' and district offices, the Forest Products Laboratory, and the Office of Wood Utilization at Chicago 2,894 books and pamphlets, bringing the total number of volumes in these libraries up to 20,827. The amount spent for the purchase of books for field libraries during the year was $2,000.

A bibliography of books on forestry in the Department of Agriculture, prepared by the department library and classified by the Forest Service, was issued during the year.

There are now 29,133 classified and tabulated photographs in the collection, 4,053 of which were added during the year.

More than 3,000 microsections of native and foreign species were added to the collection, which is used in the study of the structural characters of wood and in the identification of wood samples. About 6,500 microsections are now available.

The reference collection of native and foreign woods was enlarged during the year by the addition of 750 specimens, of which more than 150 were commercial woods from Panama, secured through cooperation with the Bureau of Plant Industry. The entire collection now includes about 6,800 specimens. About 400 specimens were added to the forest herbarium, which now contains 5,400 reference specimens, and approximately 1,000 tree-range records were added to those on file. Sixteen new maps, showing the distribution of different tree species, were prepared.

Members of the Forest Service delivered 185 public addresses during the year, mainly in response to requests from educational institutions and associations of lumbermen or lumber manufacturers. In addition, about 50 informal addresses were made to stockmen and other users of the national forests. Exhibits were made at the Spokane Interstate Fair, Spokane, Wash.; Oregon State Fair, Salem, Oreg.; Walla Walla County Fair, Walla Walla, Wash.; Arkansas-Oklahoma Fair, Hot Springs, Ark.; Southern Commercial Congress Exhibit, Washington, D. C.; Appalachian Exposition, Knoxville, Tenn.; National Land and Irrigation Exposition, Pittsburgh, Pa.; Maryland Week Exposition, Baltimore, Md.; Insular Fair, San Juan, P. R.; Pacific Land and Products Exposition, Los Angeles, Cal.; Washington Academy of Science Exhibit, Washington, D. C.; and Boy Scouts' Exhibit, New York City. One of these exhibits was supplemented by explanatory lectures. All expenses for transportation and installation of material and for travel and subsistence involved in making the exhibits was borne by the exposition authorities, except in the case of the National Land and Irrigation Exposition, which went into bankruptcy, making it necessary for the Forest Service to pay a portion of the cost of securing the return of its material to Washington. The greater part of the matter exhibited, consisting of bromide enlargements, transparencies, maps, and charts, was material left on hand from previous expositions.

WORK FOR THE ENSUING YEAR.

Work for the ensuing year will follow in the main the same lines as that of the past year. The scope of many projects will be broadened, certain closely related lines of work will be taken up, and every effort will be made to bring to completion such work as can be accomplished in a comparatively short time. So many of the investigations and experiments described in the body of this report must of necessity extend over more than one year that specific mention of a number still under way will not be made.

The classification, survey, and listing of national forest lands chiefly valuable for agriculture, provided for in the appropriation act of August 10, 1912, will be begun. Men well qualified by training and experience will be selected to have direct supervision over the work, to which they will give their entire time and attention. Experts from the Bureau of Soils will assist in the classification. Field examinations will be detailed and thorough, and will take into account all factors, such as climate, topography, soil, stand of merchantable timber, and value for purposes other than agriculture, influencing the comparative values of the lands examined. Parties have already been organized and are proceeding with the work on eight forests. This work will be extended to other forests as rapidly as men are available. Effort will be made to sell the stumpage on agricultural lands listed as temporarily more valuable for timber, in order that these lands may as soon as possible be opened to entry. The great area to be classified and the necessity for thorough and painstaking examinations will necessarily cause the work to be extended over several years. It will, however, in no way interfere with the regular handling of applications for homesteads under the act of June 11, 1906.

The work of preparing detailed fire plans for the national forests will be carried forward as rapidly as possible. Along with this will go further study of effective means of locating and reporting fires and of how to use the small protective force to the best advantage. Lookout stations will be established and equipped, trails and telephone lines constructed, and fire-fighting equipment purchased to the extent that funds permit. A great deal of attention will be given to the problem of bringing home to the public the necessity of cooperating with the service in the prevention and suppression of forest fires.

In conformity with the plans outlined in the body of this report, effort will be made during the year to bring the total amount of timber sold as nearly as possible up to 3,000,000,000 feet. As one of the means of accomplishing this, improvement will be sought in methods of advertising and in otherwise bringing available timber to the attention of prospective purchasers. Particular attention will be given during the year to the development of a policy for large sales that will be practical from the standpoint of the lumberman and that will at the same time insure protection to the interests of the United States. A modification of the timber-sale policy regarding small sales will be made necessary by the provision in the agricultural appropriation act for the fiscal year 1913, which directs the Secretary of Agriculture to sell at actual cost to homestead settlers and farmers, for their domestic use, the mature dead and down timber in national forests. Heretofore the law has provided that sales of national forest timber not exceeding $100 should be made at its appraised value, and that timber of value exceeding $100 should be advertised for at least 30 days and disposed of to the highest bidder. Under the present amendment timber desired by homestead settlers and farmers for their own use will be sold to them without advertising at a price based upon the cost per thousand feet of making and administering such sales.

Preparation of working plans as a means of systematizing and placing upon a definite, clean-cut basis the management of the different forests will be continued. Forests where the use of one or more resources is very intensive, or promises to be in the near future, will be given first attention. Preliminary plans will be prepared for all forests as rapidly as possible. As a basis for the work, timber reconnoissance will be extended to cover as many new forests as the force and money available will permit.

During the winter the central investigative committee will meet, and, with the recommendations of the various district committees before them, will pass upon plans for investigative work of the entire service during the following season.

As indicated in the body of this report, reforestation work during the coming year will be confined to experimental studies and to the reforestation of approximately 30,000 acres, or as near that area as available funds will permit. As a result of the work carried on during the past year, experiments in reforestation will be conducted with a more definite idea of the lines along which the work should be concentrated. In the actual reforestation it will be possible to devote much attention to perfecting methods to secure better results in large operations and to reduce costs.

The establishment of local experiment stations on national forests has been so fruitful of results that the system will be extended to include additional forest types and regions in the Northwest. In studies at the experiment stations special emphasis will be laid on methods of cutting the different types of forest to secure natural reproduction. The general study of forest types and the physical factors which determine them will be continued. The study of the relation of forest cover to streamflow now being made at the Wagonwheel Gap Station in the Rockies will, in all likelihood, be extended to the Southern Appalachians. During the coming year the timber on one of the two watersheds at Wagon Wheel Gap will be cut and sold and the slash burned. This will give for the first time an opportunity to compare the regimen of streams from protected and unprotected watersheds, the difference between which was definitely established before any change in their surface cover took place. In cooperation with the University of Wisconsin, problems relating to the forests of Michigan, Minnesota, and Wisconsin will be studied at the experiment station at Cloquet, Wis.

Much attention will be given during the year to problems of forest mensuration. In the past, work along this line included only the collection and tabulation of field measurements on growth, volume, and yield of trees. A large amount of the data thus far collected will be analyzed during the coming year and an attempt made to establish general laws of tree growth.

The grazing reconnoissance on the Coconino, Tusayan, Targhee, Manti, Medicine Bow, and Minam Forests will be completed, and the work extended to others. General grazing studies will include collection, identification, and determination of the economic value of approximately 6,000 specimens of range plants; means of securing natural revegetation of depleted lands by alternation in the use of ranges; methods of handling stock by which waste and damage may be minimized, fire danger reduced, new ranges utilized, and the stock improved; and methods of developing water for stock upon arid ranges. More intensive investigations will include the effect of overgrazing upon stream flow, erosion, and forest reproduction, and the possibilities of artificial reseeding and of growing seed for regeneration of ranges. In connection with the grazing studies, an experiment station has been established on the Manti National Forest, known as the Utah Experiment Station, where special stress will be laid on investigations relating to the effect of grass cover and grazing upon floods, erosion, and purity of water supply.

Cooperation with the States in fire protection under the Weeks law will be continued, and the benefits of the act extended to as many new States as possible. A meeting of State officials will be held in order to arrive at the best policy and method of protection. Inspection will be made by the Forest Service to insure that the money appropriated among the various States is being properly expended. To continue the cooperative work beyond the close of the calendar year 1912 an additional appropriation under the same terms as the first one will be needed.

WORK FOR THE YEAR 1914.

Broadly speaking, the work of the Forest Service in 1914 will deal with the same general problems that have confronted it in recent years. As progress is made along the different lines of work new fields for study and investigation present themselves. The development of methods suitable to one region perhaps calls for the development of other and wholly different methods for another one. With the steadily increasing use of the national forests new problems, which must be met and solved, constantly arise in connection with their management.

One important extension of work in 1914 will be in connection with the new national forests in the East. By the beginning of the fiscal year title to some 500,000 acres of land in the Appalachian and White Mountains probably will have passed to the Government, and this area and additional areas acquired during the year will be put under administration. Since these forests are in the center of a region of large population their use should be intensive from the first. To handle the investigative problems in connection with management of the eastern forests, experiment stations will, if funds are available, be established to conduct studies in the different forest types. Adequate means of fire protection suitable to the region will be developed and preliminary work done in the reforestation of denuded lands.

The work of classifying national forest lands, as provided for in the act of August 10, 1912, will be continued through the year, and every effort will be made to bring the work as far toward completion as possible.

During the year results of the policy of making large timber sales should become manifest in a greatly increased cutting of national forest timber. Reforestation to about the same extent as in the previous two years will be continued, but, guided by past investigations and results, with improved methods and, it is hoped, at lower cost. Working plans for some of the forests whose resources are intensively used will be brought to completion and substantial progress made toward the completion of preliminary plans for all forests. If funds are available the system of experiment stations will in all likelihood be further extended to cover additional forest types in the West.

Grazing reconnoissance will be extended to a number of new forests. Studies in connection with the effects of grazing upon stream flow, erosion, and forest reproduction, reseeding of range areas, revegetation of depleted lands, and of various methods of handling stock will be further developed.

Cooperation with the States in fire protection will be carried forward if a further appropriation is provided for that purpose. On the national forests the work of preparing detailed fire plans and of devising means of adequate fire protection will continue to receive the attention that the urgency of the problem demands.

REPORT OF THE ACTING CHEMIST.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF CHEMISTRY,
Washington, D. C., September 2, 1912.

SIR: I have the honor to transmit herewith the annual report of the Bureau of Chemistry for the year ending June 30, 1912, together with the plans for the work proposed for the next fiscal year.

Respectfully,

R. E. DOOLITTLE,
Acting Chief of Bureau.

HON. JAMES WILSON,
Secretary of Agriculture.

FOOD INVESTIGATIONS.

SPECIAL INVESTIGATIONS OF THE DIVISION OF FOODS.

CANNED FOODS.

The study of the canning of food products for the purpose of improvement in quality and processes of manufacture, as well as the securing of information for the enforcement of the food and drugs act, has been continued during the past year. The results of the investigations as far as completed have been assembled in popular form in Chemistry Bulletin No. 151, which gives a description of the conditions and the methods followed in the better type of factories. The study of the quantity of material in each can and the degree of temperature and length of time for proper processing makes this work of especial interest to the canners.

The work now in progress involves a detailed study of the canning and preserving of fruits, especially in California. The number of questions involved are so numerous and some of them so complicated that a special laboratory has been equipped for this work. It is in fact a miniautre canning and preserving factory, duplicating on a small scale the equipment used in the best commercial plants; it is provided with its own steam plant, sterilizers, retorts, exhauster can-capping machines, various styles of jacketed kettles, two vacuum pans, cooking coils, vacuum and pressure pump, vacuum glass sealer, hydraulic press, clarifier, and various testing apparatus. A bacteriological laboratory is attached to study the organisms normally present on the fresh products and those present in decay. The chemical work is carried on in the San Francisco food and drug inspection laboratory.

SLACK FILL.—For the purpose of competition there has sprung up among certain canners the practice of filling their cans partially with food and adding a sufficient amount of water to fill to the required content. The water has been added especially to products where its addition was not apparent to the observer, as in canned tomatoes, and to other foods where its addition was apparent, but where the average consumer would not recognize it as added water, as in cove oysters, in which only 1½ ounces of oysters were sometimes placed in a can which would hold nearly 6 ounces and the can then filled with a weak brine. While these practices were not general in the canning industry they were sufficiently prevalent to be regarded seriously, and a study was made of the problem, including necessarily a considerable amount of analytical work. The study was conducted in a number of commercial canneries as well as in the laboratory, and as a result food inspection decision 144 was issued, requiring cans to be as full as practicable of the food supposed to be present and forbidding the addition of unnecessary water.

TIN CONTENT.—The study of the corrosive action of various canned foods upon the tin of the receptacles and the consequent tin content of the food preserved has been continued. About 30 varieties of food in tin receptacles have been reexamined after an interval of one year and the increased solvent action noted. The results are of value in determining the character of container which should be employed with the different varieties of food.

The division has also collaborated with the research committee of the National Canners' Association in a much more exhaustive investigation of the same general nature. This work involved the determination of tin in about 250 samples of canned food, with the result that the corrosive action of the foods on the container seems to be due not only to the chemical action of the acids of the strongly acid foods and of the volatile alkalies of some of the nonacid foods on the uncoated plate, but also to the amount of oxygen included in the can. A study of the action on tin plate of some of the nonacid foods reported a year ago has been extended and Circular 79 has been published, giving the results of the work. Food inspection decisions 142 and 148, issued by the Board of Food and Drug Inspection, forbidding the use of saccharin and copper sulphate in food products, will probably affect some canning methods.

SANITARY CONDITION OF FOOD MANUFACTURING ESTABLISHMENTS.

One of the most important problems in connection with the manufacture of food is the bettering of the sanitary conditions under which the processes of manufacture are conducted. Several States have enacted laws regulating the maintenance of food-manufacturing establishments in a sanitary manner. This is not required directly by the food and drugs act, but the question is important to its enforcement, since the use of insanitary establishments sometimes results in the production of foods which are regarded as in violation of the Federal food and drugs act because of their content of filthy, decomposed, or putrid material. The question of sanitary conditions of a factory, therefore, is inseparably connected with the question of spoilage in food.

The studies regarding tomato spoilage have been extended in collaboration with the branch laboratories and additional data secured which is of value in the interpretation of the results obtained in the examination of tomato ketchup. Analysis was made of many of the common brands of ketchup sold on the American market. As would be expected, the decomposition of tomatoes in various localities does not proceed uniformly because of the lack of uniformity in the organisms which have led to the decomposition. The work has been extended, therefore, in collaboration with the microchemical and bacteriological laboratories by the application of pure cultures isolated from spoiling tomatoes in varying localities. This work was begun in April, since which time 16 samples subjected to the action of definite organisms have been examined from time to time.

The same general methods have been applied to the study of the common berries on the market, but have not been found to be so generally applicable.

Some attention has also been given to methods for the detection of spoilage in other products, as frozen and desiccated eggs, gelatin, and coffee containing a large number of imperfect or decayed berries, ordinarily known as quakers and black jacks, and also of coffee that has been damaged by various causes during shipment.

FRUIT PRODUCTS.

ECONOMIC STUDIES.—The studies on fruits and fruit products in collaboration with pomologists in charge of the field investigations of the Bureau of Plant Industry have been continued. A field study on the processing of Japanese persimmons to render them nonastringent was made during the past season and the results published. It was found that all varieties of Japanese persimmons tried could be satisfactorily processed on the large scale by keeping them in carbon dioxid for a time varying with the variety and the temperature.

The methods previously applied to the preparation of grape juice and apple juice have been studied with reference to the modifications necessary for their application to juices of other fruits, and the juice-yielding properties of many varieties of grapes grown in the eastern part of the United States have been studied in collaboration with the viticulturist of the Bureau of Plant Industry. A study has also been made of methods for the preparation and preservation of orange and lemon juices to make them hold their color and flavor. In the last year it has been found possible to prepare juices which hold their color for several months and whose flavor deteriorates much less than in juices heretofore prepared. Recent studies indicate the possible value of concentration of such juices by means of freezing. This method appears promising, from the experimental study that has been made, and it is proposed later to conduct a small commercial experiment to determine its cost.

A study on a small laboratory scale has been made of the drying of fruits in vacuum, together with an absorbent for water vapor, such as unslaked lime. The quality of the article prepared in this manner is so satisfactory as to make it appear advisable to conduct experiments on a small manufacturing scale for the purpose of determining the cost, and also in order that a sufficient amount of the product may be prepared for a study of its maintenance of color and flavor during storage.

During the year some of the orange districts suffered from frost and many of the oranges were frozen on the trees. This resulted in the placing on the market of a large number of shipments of oranges containing a varying percentage of frozen fruit. A preliminary study of possible methods for the detection of frozen fruit was made in the Division of Foods, and the matter was then transferred to the San Francisco laboratory for field investigation.

CHARACTERISTIC ACIDS.—Much attention has been given to the identification of the acids occurring naturally in various fruits and to the determination of the amounts of these acids. This information is of value in the examination of samples taken under the food and drugs act and also in connection with the constructive work of the bureau. The character of the acid present in a prepared fruit product may be used for the identification in a general way of the variety of fruit employed in its preparation, or at least it may often afford evidence of the absence of a fruit claimed to have been employed. It also affords means of determining the changes of composition during the manufacture of some foods, as, for instance, wine, and of determining to a certain extent the method of manufacture that has been employed. The fruits examined included many varieties of apples, pears, strawberries, raspberries, blackberries, cherries, currants, gooseberries, quinces, huckleberries, apricots, and peaches.

SUGAR-ACID RATIO.—It is the practice in the preparation of the highest grade of canned fruits to vary the strength of the sirup added according to the flavor desired. This seems to depend mainly on the acidity of the fruit; for instance, a 60 per cent sirup is employed with some strongly acid fruits, whereas with certain fruits of medium or low acidity the maximum sugar content is 40 per cent. It is believed that more satisfactory results can be obtained by determining the acidity of the fruit in the cannery and giving closer attention to the sugar-acid ratio in the finished product. This matter is being studied in the canning laboratory of the bureau located at San Francisco, Cal., and in collaboration with this work the Division of Foods has determined the sugar and acids and the ratio of the two in about 200 samples of fresh apples and peaches and a somewhat larger number of samples of canned fruits of various varieties.

CITRUS BY-PRODUCTS.

The field work of this laboratory has made splendid progress during the year. The experimental plant has been installed at Los Angeles, Cal., for making practical commercial tests upon the production of citrus by-products early in the coming winter. Experiments have been tried both in the field and at the laboratory in Washington, and many practical experiments now await only the practical field test as a final proof of their efficiency. The chief of the laboratory has visited several commercial plants and made practical tests as to the availability of the manufacturers' machines for use in this work, and no little benefit has been derived from the experience gained.

Essential Oils Used for Flavoring Food Products.

Much time has been devoted to research work on the methods for the determination of the active constituents of essential oils and to general methods for the detection of their adulteration. It was found that many of the methods of analysis, as well as physical constants, given in the current edition of the Pharmacopœia were not up to date, so that the work on each individual class of oil has had to be done simultaneously with a special investigation upon samples of known origin. It is hoped that the results of these investigations will shortly be published as a circular.

The work included a general investigation upon oil of bitter almond, with special reference to methods for determining the amount of benzaldehyde therein, but was also extended to include the determination of hydrocyanic acid, benzoic acid, and of chlorin; the determination of cinnamic aldehyde in cinnamon and cassia oils, together with the detection of added rosin; and the detection of glycerin in lavender oils.

Edible Oils.

The work on the commercial production of peanut oil taken up last year has been continued. Sixteen lots of material (supplied in part by the Bureau of Plant Industry) have been expressed in the oil expeller under varying conditions of moisture content and temperature and the most economical method of treatment for Spanish and Virginia peanuts determined.

The preparation of samples of oils of known origin and purity has been continued this year, and there have been added to the stock sunflower oil pressed from the seeds of the Mammoth Russian variety, coconut oil made from fresh nuts dried in an evaporator and pressed in an expeller, and several samples of pecan oil, which were pressed out in a hydraulic press from material supplied by the Bureau of Plant Industry.

The chief of the oil, fat, and wax laboratory, as an associate referee of the Association of Official Agricultural Chemists, has conducted investigations on several methods proposed for the analysis of fats and oils, some of which will be adopted officially.

In collaboration with the Interstate Cottonseed Crushers' Association's committee on uniform methods, a series of analyses have been made on cottonseed products and recommendations as to the best methods for adoption as official by that association transmitted to them.

The study begun last year on the chemical composition of soft-shell pecans and their oil, with a view to determining whether the composition would shed any light on the distinguishing features of various varieties and the effect of different climatic conditions upon this chemical composition, has been continued in collaboration with the Bureau of Plant Industry and will shortly appear as part of a bulletin of the Division of Pomology.

Miscellaneous.

A number of investigations have been undertaken to which a varying amount of attention has been paid. Some additional study has been given to bleached flour with a view to determining methods for the detection of bleaching agents other than nitrogen peroxid. The salt content has been determined in a number of samples of water in oyster beds. A study has been begun of the various lac preparations and the question of the application of lac to the glazing of candy. Attention has been given to the manufacture of calcium acid phosphate intended for bakers' use, especially with a view to determining the effect of added calcium sulphate in the process of baking, and it has been determined that the presence of calcium sulphate increases the amount of carbon dioxid evolved, hastens its evolution, and increases the amount of insoluble residue by reason of the product closely approaching tricalcium phosphate.

Examination of Samples for Other Departments.

Several hundred samples of miscellaneous food products were examined during the year for the Army, Navy, Panama Canal Commission, the Insane Asylum of the District of Columbia, and especially for the General Supply Committee.

WORK OF THE FOOD RESEARCH LABORATORY.

The food research laboratory has continued its study of the handling of perishable products, using poultry and eggs as the objects on which to work out the fundamental principles of good handling. The phases of the problem and the field of operations have been broader than in preceding years. The main lines of investigation have been (1) the study of the rate of deterioration in "wet-packed" as compared with "dry-packed" poultry; (2) the effect of temperature during long railroad hauls on dressed poultry; (3) the effect of the present methods of routine marketing in large cities on the rate of deterioration in dressed poultry; (4) the effect of temperature on the rate of deterioration in eggs during transportation and storage; (5) the study of the changes in eggs produced by their environment; and (6) the methods of handling eggs when removed from the shell to be frozen or dried for preservation. All of these topics have been approached from the practical as well as the scientific side, the field work having been centered in New York City, Nashville, Tenn., and Omaha, Nebr.

Field Station.

The field station, which includes an excellently equipped laboratory located in a poultry-packing house in Nashville, Tenn., for a little more than the past fiscal year, has prepared, examined (bacteriologically and chemically), and shipped to the receiving station in New York experimental packs on a commercial scale, to study the relative keeping time of "wet-packed" and "dry-packed" and "well-bled" and "badly-bled" poultry. The conditions maintained during the haul in refrigerated carriers were followed by thermograph records, and in a number of shipments by means of resistance thermometers read at frequent intervals.

Visits were made to 128 poultry-handling establishments in Ohio, Indiana, Kentucky, and Tennessee, where the general conditions of the trade were discussed with the shippers with the object of improving their methods. As a result of the actual work performed in these establishments, and of the advice given to shippers to use mechanical refrigeration for the handling of eggs and the cooling and packing of poultry, the number of plants using mechanical refrigeration in Kentucky and Tennessee has increased during the last fiscal year from 2 to 6 and the tonnage of refrigeration has increased from 48 to 160 tons.

At the request of the management of the Tennessee State Fair, a commercial poultry exhibit and demonstration was held in connection with the fair in the latter part of August, 1911, consisting of charts giving brief directions for the better handling of market poultry and eggs, cases containing commercial grades of eggs, showing the monetary loss to the farmer and consumer due to the production of inferior eggs, dressed poultry showing best and poorest types, milk-feeding batteries with chickens actually being milk fed, and killing demonstrations by professional poultry dressers. Daily talks were given on the handling of poultry and eggs.

The laboratory has been visited by approximately 100 people, including shippers desiring information regarding the handling of poultry and eggs, railroad men wanting information regarding refrigerative cars, temperatures, and insulation; Government meat inspectors, cold-storage men, agricultural extension college professors, poultry raisers, editors of poultry and trade papers, veterinarians, chemists, housewives, etc.

During the past year an all-metal cooling truck for the cooling of poultry was perfected and is being rapidly adopted by the poultry packers of the country. This truck is covered by patent No. 1020575. A killing frame for the better killing of poultry has been devised, and a picker's ticket for use to determine the numbers of chickens picked by each picker has been designed.

Two phases of the field work at the Nashville station have excited an unusual amount of interest, (1) buying eggs and poultry on a "quality basis," and (2) the improved results obtained in the shipping of eggs by cooling before loading and transportation under refrigeration. The old custom of buying eggs in 30-dozen lots, paying a definite sum, regardless of the percentage of loss, is changing slowly but surely to the quality basis, where the shipper usually separates the eggs into three grades, paying a different price for each, according to the quality, and paying nothing for rotten or moldy eggs.

The precooling of eggs has been accomplished for the education of the shippers far from mechanical refrigeration by means of a portable refrigerating plant installed in a refrigerator car. The principles were devised by the Division of Field Investigations in Pomology, Bureau of Plant Industry, for use in their fruit-marketing work in the far West. They cooperated with this bureau in adapting and modifying those principles to render them applicable to the work of this bureau. The result is a well-insulated portable room, divided by a partition, in which a temperature at or near 0° C. can be maintained. The space is sufficient to permit of handling eggs or poultry in 10,000-pound lots. Eggs precooled in this car were shipped during May and June from Winchester, Ky., to New York. The results indicate a remarkable saving in quality as compared with eggs not precooled.

The relative rate of deterioration in fertile and unfertile eggs has been studied in the laboratory in more than a hundred samples, using the candle as a means of grading.

MARKETING OF POULTRY AND EGGS IN NEW YORK.

A member of the staff of the Food Research Laboratory has been almost constantly in New York City during the past year to receive experimental shipments of poultry and eggs and to study transportation and the whole complex marketing system in New York City as applied to perishable products.

During the year 8 cold-storage warehouses, 33 commission houses, and 15 retailers have been in close touch with the work, in most cases cooperating with this laboratory. The New York City commissioner of docks and other public officials in connection with the establishment of a new municipal market have called for information concerning the handling of perishables, that the losses to the people in both quality and quantity may be reduced as far as possible.

INVESTIGATION OF FROZEN AND DRIED EGGS IN OMAHA.

The investigation at the Omaha food and drug inspection laboratory, begun in June, 1911, and continued until early in September, was outlined in the report of this laboratory for 1911. From July until September active work was conducted in six plants which were preparing frozen or dried eggs. The prevailing conditions, as well as the various grades of eggs which went into the commercial product, were studied carefully. The eggs used by the industry were taken to the laboratory and there handled as the industry handled them; the improved methods worked out in the laboratory were transferred to the commercial breaking rooms and applied to the eggs used there. The results showed that good eggs, unless handled properly, would not give a bacterially clean product and that many eggs which would not be good at the market center, generally a six-day haul away, were good food if broken and frozen or dried immediately. Such studies also served to locate the sources of contamination, and, having located them, the problem shifted to the study of means for their elimination. The practical application of the principles of bacteriological cleanliness to commercial procedures must be the basis for the handling of eggs out of the shell, just as it must be in dairying for the handling of milk out of the cow. The fundamentals gathered from the work of the summer of 1911 have been published as Bureau of Chemistry Circular No. 98, Practical Suggestions for the Preparation of Frozen and Dried Eggs. During the winter some work was done cooperatively with a bakery which used the frozen eggs prepared by one of the plants which had been studied during the previous season, thus following the product to the consumer.

The egg season of 1912 opened with three egg-breaking plants equipped with facilities for handling eggs in accordance with the knowledge gained during 1911 and in May a fourth plant was added. A member of the staff of the food research laboratory has spent the summer in these newly equipped houses, watching methods, experimenting, noting the variation of the eggs with the season and the weather, and collecting samples of all sorts to be examined by the chemists and bacteriologists located in the Omaha food inspection laboratory, which, for the summers of 1911 and 1912, was turned over to this egg investigation exclusively.

The scientific and practical results obtained on the handling of this perishable product, the mechanical devices used to wash and sterilize utensils, and the gain in efficiency of work and in quality of product by the application of what may truly be called "scientific management," furnish a broad field for further endeavor in the evolution of a pure, clean food supply. It is planned to publish a full account of this work as soon as the data are sufficiently complete.

WORK IN PHILADELPHIA.

The headquarters in Philadelphia maintain a close relationship with all the branches of the field work, that information gained in one place may be quickly transmitted and utilized in another and that the widely diversified phases of study and fields of operations may be correlated and the logical progress of the work as a whole ensured. The more elaborate scientific studies are worked out, methods to be used in the field work devised, and all of the routine chemical and bacteriological examinations in connection with the study of experimental shipments and marketing are made in the main laboratory.

POULTRY.

During the past year, in connection with the field work and shipments of wet-packed and dry-packed chickens, a study has been made of the amount of water absorbed by the chicken and the amount of nutrient material dissolved out of the chicken when the wet-packed system is practiced commercially. Calculating on the 20,000-pound car-lot basis, wet packing for each car of poultry would cause the consumer to pay chicken prices for about 1,300 pounds of water and to lose down the drains about 300 pounds of the best food material that chicken flesh contains. Such economic losses are too great to pass unnoticed.

A study has also been made of the comparative keeping quality of wet and dry packed birds when hard frozen, carrying them through the whole routine of marketing as usual. Other investigations are indicated by the following titles of circulars published during the year: "The Occurrence and Permanence of Lipase in the Fat of the Common Fowl" and "The Oxidation of Chicken Fat by Means of Hydrogen Peroxid" (Circular 75), as well as by titles to publications now in press, namely, "The Influence of Temperature on the Lipolysis of Esters," "The Hydrolysis of Chicken Fat by Means of Lipase," and "The Occurrence of Catalase, Oxidase, and Reductases in the Fat of the Common Fowl."

EGGS.

Shipments of eggs have been studied along lines paralleling the study of poultry, using generally the "southern" egg as the subject of experimentation. The enzyms occurring in fertile and unfertile eggs, fresh and stale eggs, kept at low and high temperatures, were also examined and the results submitted for publication under the title "A Study of the Enzyms of the Egg of the Common Fowl."

Eggs have also been studied for the rate of loss of water from the white at varying temperatures and the diffusion of water into the yolk, the results having been given in Circular 83, "Deterioration of Eggs as shown by Moisture Content."

A special study of moldy eggs has been made, looking toward a knowledge of this condition in eggs and their consequent unfitness for food. The penetration of egg shells by molds and bacteria has also been under investigation.

CONCLUSIONS.

The need for personal contact with the industries handling poultry and eggs has been more forcibly emphasized during the past year than before. It is not possible, with the small field force, to extend the application of better methods by individual visits; hence an effort is made to meet the men at their own industrial gatherings or at special meetings arranged by the industry forces. Accordingly, the members of the staff of the food research laboratory have addressed 19 different meetings of about 7,500 people in various parts of the country. These gatherings included meetings of shippers of perishables, railroad men, warehousemen, middlemen, producers, consumers, and educators.

Number of samples examined and analyses made.

	Philadelphia food research laboratory.	Nashville station.	Omaha food inspection laboratory.	Total.
Samples of eggs for chemical analysis	160	14	567	741
Samples of poultry for chemical analysis	347	58	....	405
Samples of eggs for bacteriological examination	77	240	832	1,149
Samples of poultry for bacteriological examination	333	232	....	565

BACTERIOCHEMICAL INVESTIGATIONS.

The principal bacteriochemical investigations conducted at Washington during the past year concern the conditions surrounding the oyster, clam, frozen and desiccated egg, and gelatin industries. A study of the influence of frozen and desiccated egg products on laboratory animals was made. Numerous examinations were made of shell eggs of known history, making separate determinations from the albumen and yolk.

Several State health authorities have cooperated in the examination of the waters, oysters, and clams from various localities. As a result, many oyster sections which have shown pollution have been closed as a source of edible oysters.

In connection with other laboratories, many examinations have been made of gelatin (see p. 577), dairy products, infant foods, cattle feeds, tomato products, and water.

The following tabulations show the nature and number of bacteriochemical examinations made during the past year of interstate and research samples:

Interstate samples:	
Antiseptics and disinfectants	5
Butter	6
Canned goods	14
Clams (shell)	15
Corn meal	5
Cream (raw and pasteurized)	26
Eggs (desiccated)	36
Eggs (frozen)	39
Eggs (liquid)	36
Eggs (shell)	12
Gelatin	6
Hay	20
Infant foods and milk powders	14
Jam and preserves	24
Milk (raw and pasteurized)	542
Mincemeat	31
Miscellaneous	25
Oysters (shell and shucked)	146
Tomato products	324
Water	47
Total	1,373
Research samples:	
Air analyses	25
Canned goods	18
Cheese	10
Clams (shell)	10
Disinfectants	21
Eggs (frozen and desiccated)	73
Eggs (shell), yolk and albumen	1,440
Gelatin	659
Milk (raw and pasteurized)	12
Miscellaneous	36
Oysters (shell and shucked)	132
Water	326
Total	2,762

The total number of samples examined bacteriochemically, both interstate and research, was 4,135.

SUGAR AND SUGAR PRODUCTS.

Maple Products.

The investigation of the maple products industry of the United States, undertaken three years ago, has been continued. The report covering the work on maple sap sirup has been published, while that on maple sugar and maple-sugar sirup has been written and held awaiting further investigations on special features of the industry. The work during the past sugar season showed the necessity of more extended experimental study of the effect of metals on the appearance and composition of the sirup, the changes in composition of maple sugar and sirup in storage, and the effect of manufacture from sour sap. As the maple season is so short, lasting not more than two weeks to a month, the manufacturer of the samples must be done during that time and analysis made later, so that but little apparent progress can be made in one season.

CANE SIRUP AND MOLASSES.

The samples collected some two years ago for an investigation of the moisture content of these products received a rather complete analysis. During the past sugar-making season another lot of samples was collected and analyzed. The results of these tests are being tabulated to form a nucleus for a knowledge of the composition of cane sirup and various grades of cane molasses. Samples of imported molasses are being studied chemically to see if they differ from the products of the United States. This whole subject, together with that of sorghum sirup, must receive much original work, as the differentiating reactions and bodies are little known and the chemical means of distinguishing them are very meager at present.

SORGHUM SIRUP.

During the past season, samples of sorghum sirup from two manufacturing districts of the United States were collected and the study of chemical means of differentiating this sirup from the sirup made from sugar cane has been receiving attention.

EFFECT OF ENVIRONMENT ON SUGAR CONTENT OF MUSKMELONS.

In continuation of the study of the effect of environment on the composition of food products where sugars play an important part, the work for the past two years has been on muskmelons. Analyses of the melons grown at the stations in Florida, Arizona, Colorado, Kansas, Indiana, Maryland, New Jersey, and Connecticut tend to corroborate in a general way the inference drawn from the first year's work, namely, that climatic conditions induced by relatively lower temperature and higher altitude interact on each other to produce a sweeter melon. Some attention has been devoted to the chemical changes involved in growth and ripening of this melon. In cooperation with the Vermont Agricultural Experiment Station, many analyses were made of the "Montreal Market Melon" grown in New York, Vermont, and Canada, and the results are forthcoming in a bulletin of that station. The Bureau of Plant Industry cooperated by supervising the growing of the crop and furnishing the seed.

MISCELLANEOUS INVESTIGATIONS.

POWDERED SUGAR.—The question of the use of starch in powdered sugar is receiving attention. Numerous samples have been collected from the grinders of granulated sugar by the official inspectors.

ANALYTICAL METHODS.—Much time has been devoted to the preparation of the sugars, lactose, maltose, levulose, and sucrose, in as pure form as possible to be used in standardizing reducing sugar methods. Some work has been done on the Clerget method for determining sucrose in cane sugar and beet sugar products and on the changes produced on storage of sugars. About 50 varieties of grape juices have been tested for sucrose and for total sugars. A new method for the determination of total carbon by permanganate in sugar products, and its application in determining sucrose has been tried out.

VOLUME OF WORK.

During the year 1,120 samples were received for analysis, some requiring only a single determination, but many a complete examination. Besides these, about 500 samples were analyzed in the field in the environment work on the muskmelon.

DRUG INVESTIGATIONS.

OUTLINE OF WORK.

The drug division has been engaged in studying the composition, adulteration, and misbranding of drugs and chemicals, including those products imported into the United States or shipped into interstate commerce and found on our markets.

This work requires a careful study of the methods of analysis, the character and quality of normal material, and the standards at present official for certain commodities, with a view to either confirming existing standards or providing the necessary data for future effective work. For example, in order to determine the reliability of existing methods for testing the quality of hydrogen peroxid and the characterized purity of the articles supplied to the trade, an extended investigation was made upon the various brands available on the market. The results were published in Bulletin 150, entitled "Technical Drug Studies." A similar study was made of U. S. P. tincture of ginger, prepared according to a prescribed formula. No data are given as to the amount of alcohol, nonvolatile matter, etc., the finished product should contain. The results will be found in Bulletin 152 of this bureau. Similar studies are now in progress on tincture of iodin, nitroglycerin tablets, tablets in general, alkaloidal mixtures, etc.

The total number of samples examined during the year is 1,544.

Cooperation with the Post Office Department has been rather restricted during the past year. Several samples containing poisons shipped through the mails were examined, resulting in drastic action by the courts. An interesting brief review of the "Habitina" case will be found on pages 203–312 of the Hearings on Amendments to the Pure Food and Drugs Act.

SYNTHETIC PRODUCTS.

During the past fiscal year the synthetic products laboratory examined 294 samples, of which 249 were interstate, 8 import, and the remainder either unofficial or for other departments. As the result of such examination 58 cases were recommended to the chief of the bureau for prosecution. Nearly two-thirds of the samples investigated were representative tablet and pill preparations as ordinarily supplied to the jobbing and retail trade or the physicians direct. In addition to the excipients, lubricants, and more or less indeterminate plant extractives and tissues, each tablet or pill contained one or several such active principles as caffein, acetanilid, acetphenetidin, antipyrin, sodium salicylate, aspirin, salol, sulfonal, trional, veronal, hexamethyleneamin, quinin, strychnin, morphin, codein, heroin, etc. In addition to the work performed for other departments, numerous check analyses have been made for other bureau and branch laboratories.

Some 15 manufacturing plants were visited in the East and Middle West and the various methods of manufacture and control carefully observed. The information gathered in this way, taken with the evidence and data offered at various hearings held at Washington and at branch laboratories, indicated, as a rule, that the shortages or discrepancies observed in the case of certain preparations were seldom, if ever, due to willful intent on the part of the manufacturer, but rather to a lax or faulty control, either in weighing and checking the ingredients, in accounting for eventual wastage in granulation and compression, or, finally, in handling the problem of lubrication.

The investigation of various gums, as acacia, tragacanth, and Indian gum, was continued from the preceding year. A method was evolved, thoroughly tested out, and published as Circular 94, on The Volatile Acidity of Gum Tragacanth Compared with that of Indian Gum, enabling one, in conjunction with the recognized qualitative tests, to clearly differentiate between the two products, whether alone or in admixture. Methods have been perfected for the exact separation and estimation of the following combinations: Antipyrin, acetphenetidin, and codein; acetanilid, sodium salicylate, and codein; antipyrin, caffein, and acetanilid; caffein, acetanilid, quinin, and morphin.

Cooperative work on headache and similar mixtures has been continued, as in the past, with the gratifying result that methods suggested by this laboratory and submitted to outside workers for criticism have invariably met with favorable reception.

ESSENTIAL OILS.

Forty-nine samples of essential oils have been examined, of which 46 were samples from interstate shipments. Nine cases of adulteration and misbranding were reported. A number of samples for check analysis were referred to this laboratory, as well as several products of a miscellaneous character, including nitroglycerin tablets, castor oil, glycerin, etc. A research on the composition of American spearmint oil has been conducted and the results published in Circular 96 of the Bureau of Chemistry. The study of oil of chenopodium, designed to clear up the constitution of ascaridole, the medicinal constituent of that oil, is yet in progress, and it is expected that the results will soon be ready for publication. The study of methods for the determination of various essential oil constituents, particularly ketones, such as camphor, is being continued.

The analysis of authentic samples of oil of wormwood has been taken up with the purpose of establishing a standard of purity.

PHARMACOLOGICAL INVESTIGATIONS AND BIOLOGICAL TESTING OF DRUGS.

An exhaustive critical review of the literature on the action of drugs under pathological conditions, with some experiments performed in this laboratory, was published in Circular 81.

The caffein investigations of the previous years have been continued. Two reports were made, one on the toxicity of caffein, Bulletin 148, the other on the elimination of caffein, Bulletin 157. Further studies have been made on the toxicity of caffein with special reference to certain factors modifying toxicity, such as starvation, variation of temperature, and fatigue. This research is nearing completion. The toxicity and elimination of caffein under some pathological conditions, as after removal of the kidneys, were studied in rabbits. The results show increased excretion of caffein by the gastro-intestinal epithelian under this condition, but the toxicity of caffein is not markedly affected and is not cumulative. The action of caffein on the circulation, with special reference to drugs modifying its effect, has been studied extensively.

The pharmacological action of tin was begun, but little progress has been made.

Physiological tests were made with samples of spoiled cheese as to the presence or absence of a toxic substance, but the results were negative. Tests were also made upon "Ricin Preparat" which was being used in an assay method for the determination of pepsin, with a view of ascertaining its degree of toxicity.

Samples of digitalis leaves, as well as medicinal preparations, were tested; some of the latter were found to be of only fair quality and others were fully up to the standard.

CHEMICAL REAGENTS.

During the year 392 samples of chemical reagents supplied to the Bureau of Chemistry and branch laboratories on contract have been examined. Improvement is noted in the quality of chemicals supplied this year over that of those supplied the previous year. In a few instances, however, the bureau has had some difficulty in obtaining "special reagents" that will comply with their specifications and that will be of a degree of purity necessary for the special analytical work, although the manufacturers have worked in hearty cooperation with the bureau in its efforts to obtain the desired chemicals. Among these can be mentioned "special" acetic acid, 99.9 per cent pure, of which frequent rejections were made, either because the product did not comply with the sulphuric acid-bichromate test or because it was low in strength. Hydrochloric and nitric acid were also found to be unsatisfactory because of the presence of arsenic.

There has been urgent demand recently from various laboratories for mineral acids and zinc that are more nearly free from arsenic than those supplied up to this time for special investigations where exceedingly delicate tests were being employed. The bureau has had no difficulty in obtaining sulphuric acid which is practically free from arsenic, but it has experienced great difficulty in obtaining hydrochloric acid and nitric acid free from arsenic. The bureau is now experimenting with ceresin bottles to note the arsenic content of nitric acid delivered in such bottles. It has been practically impossible to obtain zinc absolutely free from arsenic. The reagent laboratory is investigating a method of testing for arsenic in its reagents by a modification of the Gutzeit test, in which electrolytic reduction is employed, thus eliminating the use of zinc and using as the electrolyte sulphuric acid, which is itself relatively free from arsenic.

Among the rejections made during the year may be mentioned the following:

Ether, specified chemically pure, contained nonvolatile matter and peroxids.

Hydrogen peroxid, U. S. P., found low in strength.

Uranium acetate, chemically pure, free from sodium, contained sodium and potassium salts.

Alcohol, chemically pure, absolute, contained nonvolatile matter and was low in alcohol content.

Benzol, chemically pure, free from thiophin, contained thiophin and other impurities.

Amyl alcohol, chemically pure, water white, contained impurities and was of high-boiling point.

Acetic acid, chemically pure, special, 99.9 per cent, some low in acetic acid content, others did not comply with the sulphuric acid-bichromate test.

Sodium bicarbonate, chemically pure, contained monocarbonate.

Sodium carbonate, chemically pure, anhydrous, low in sodium carbonate content.

Methyl alcohol, chemically pure, free from acetone, contained nonvolatile matter and acetone.

Lead peroxid, chemically pure, was low in lead peroxid content.

NOSTRUMS AND PROPRIETARY REMEDIES.

Some attention has been given to the various commodities placed on the market and exploited for the treatment of consumption, cancer, drug addiction, obesity, etc., and to the so-called proprietary remedies of secret composition. The therapeutic and medical claims used with these are often false or fraudulent or misleading. A large amount of printed matter and other data were collected and submitted at the hearing of the Richardson bill before the Committee on Interstate and Foreign Commerce. This information was published as the "Pure Food and Drug Act, Hearings before the Committee on Interstate and Foreign Commerce, House of Representatives, Sixty-second Congress, Second Session, Part II."

FOOD AND DRUG INSPECTION.

INSPECTION FORCE.

During the fiscal year ended June 30, 1912, there were collected more than 10,000 official samples of foods and drugs. With the exception of a limited number, which indicate samples obtained in the course of milk campaigns or from mail-order houses, these samples represent visits by inspectors to mercantile establishments and are indicative of the number of inspections of wholesale and retail stocks. There were approximately 1,500 factory inspections reported which were made with a view of noting particularly the sanitary conditions obtaining both in the establishment proper and on the premises, the propriety of labeling, and general practices which might be contrary to the provisions of the law. There were 446 recommendations submitted to the Board of Food and Drug Inspection which recounted the sale and interstate delivery in confiscable quantities of adulterated or misbranded food and drug products which were subject to seizure under the provisions of section 10 of the act. Besides the interruptions due to attendance as witnesses in prosecutions of cases based upon food and drug samples, the inspectors, in connection with the field forces of various other bureaus in the department, undertook the collection of samples and the consequent work involved in the performance of inspection duties in the enforcement of the insecticide and fungicide act of 1910.

CONTINUATION OF WORK FROM THE PREVIOUS YEAR.

MILK AND CREAM.—Campaigns were conducted to determine the character of milk and cream shipped by producers to St. Louis, Mo.; Providence, R. I.; and Philadelphia, Pa. While a great many of the samples of milk and cream examined were found to be adulterated from either a chemical or bacteriological standpoint, the majority obtained showed a steady improvement in the quality of interstate milk and cream since the initiation of these campaigns in 1907.

CITRUS FRUITS.—The investigation continued from last year of the practices of growers and shippers of citrus fruit showed that there had been almost a total abandonment of "sweating" resorted to by subjecting green and unripe oranges to moist and artificially heated atmosphere in order to hasten the yellow tint of the peel. There still exists, however, such a practice on the part of certain fruit commission merchants in several of the large cities, but, so far as we are able to determine, this treated fruit is sold locally and no offense committed under the Federal law. The State of Florida has passed a strict State law controlling the traffic in this product. In connection with the general work on citrus fruits, some attention was given to the shipment of frozen oranges, which were packed and offered for sale in some of the orange sections.

NEW WORK.

CANNED FOODS.—Attention was given in the fall of 1911 to the inspection of canning establishments, particularly with a view of reporting the practices of packing tomatoes and other products with what is technically known as "slops" or added water. A comparison of the reports submitted on the conditions existing last fall, particularly from the standpoint of sanitation, shows a marked improvement over the conditions that existed at the time previous inspections were made. This rigid inspection in the case of tomato products, noting the disposition of the pulp manufactured from skins and cores, was carried from the canning establishments to tomato-ketchup factories. Such observation, together with the prosecutions that followed against shipments of inferior grades, resulted in the marketing of ketchup which, from a standpoint of sound and clean material used and sanitary methods of handling, is decidedly superior to that placed on the market two or three years ago. Continued attention was given to the inspection of canning establishments engaged in the packing of salmon.

CHEESE.—Special attention was given to the interstate shipment of short-weight cheese. As a result of this investigation in certain sections of the South, more than 30 shipments, each of considerable quantity, were confiscated.

STOCK FEEDS.—In the early part of the year attention was given to the shipment of damaged grains sold for stock-food purposes. After confiscation of one or two shipments of such goods, however, further attention by inspectors was arrested pending an extensive investigation by another bureau of this department to determine the wholesomeness or unwholesomeness of water-damaged grains.

MISCELLANEOUS.—An investigation was made of the character of foods dispensed by railroad companies on the dining cars which plied between interstate points. Samples of manufactured drugs and other pharmaceutical products were collected for the drug division. In cooperation with the bacteriological laboratory an examination was made in several States of the various propagating grounds used by oyster and clam growers. Several seizures of shipments of both oysters and clams and a great many criminal prosecutions were instituted as a result of the apprehension of shipments and the collection of samples found to be polluted and grown in polluted waters.

Upon complaint from citizens residing along the Mexican border in the States of Texas, New Mexico, and Arizona, an investigation was made of the character of meat and meat-food products imported from Mexico, which, because of certain laws governing importations, were exempt from inspection by the Bureau of Animal Industry.

The inspection of food and drug supplies shipped to and offered for sale in Alaska, begun during the summer months of 1911, was concluded before navigation closed late in the same season, and the results indicate the wisdom and necessity of regular inspection in that Territory.

One of the special assignments of interest to the inspection force was an investigation of the preparation and exportation of horse meat by an eastern firm. This product was offered for sale in Holland, where there is an extensive traffic in such meat. The firm processing and packing the meat was one engaged in the purchase of carcasses of dead horses and cattle, as well as fat from various sources, which was rendered into tallow. As far as known this was the only business of the establishment. It was soon determined that in the course of their legitimate work certains cuts or sections from the carcasses of horses brought for consignment to the rendering vats were transported to a near-by building and pickled for exportation for human consumption, directly contrary to the provisions of the law, which deems a meat adulterated if it be from an animal killed otherwise than by slaughter. In the course of this investigation it was necessary to assign several inspectors to the collection of the different phases of evidence necessary to establish a violation of the law. After the required testimony had been obtained, but before the exportation of the shipment under surveillance, the packers were informed of the operations of our inspectors through the treachery of a local health inspector with whom our men had cooperated. All of the facts in the department's possession were submitted to the State authorities and an action was instituted under the State law.

Another class of trade which tested the ingenuity of the inspectors giving attention to the matter was locating and stopping interstate shipments of rotten eggs which were labeled for technical purposes only, but which after arrival at destination were broken, frozen, and subsequently sold to baking establishments for use in food products.

While undertakings of this character are important, they require the exercise of patience and caution and the exclusive time of several inspectors; in fact, more than can at present be spared from the regular routine inspection work, which involves the attendance as witnesses at trials. It is believed, however, that it will be practicable to give more attention in the future to this line of work, particularly if whatever increase there may be to the present small inspection force approaches the number adequate to supervise the tariff in food and drug products with that degree of thoroughness necessary for the efficient enforcement of the law.

INSPECTION LABORATORIES.

Washington Drug Inspection Laboratory.

During the past year the Washington drug inspection laboratory has examined 809 samples, as follows: One hundred and sixty-five check analyses of imported drugs, 40 import products coming directly under this laboratory, and 604 samples of domestic products. Of the last class, 132 (22 per cent) were found to be either adulterated or misbranded, or both. Two hundred and nine cases of interstate drugs adjudged to be adulterated or misbranded were prepared in this laboratory and reported to the chief of the bureau for transmission to the Board of Food and Drug Inspection. Import drug cases, representing detained shipments not reported directly to the collectors of customs upon precedents, were referred to this laboratory. Two hundred and eight import drug cases were prepared for the board, of which 196 were found to be in violation of the law and 12 were released without prejudice.

DOMESTIC DRUGS.

The scope of the work during the past year has been more extensive than in previous years. Much time has been devoted to pharmaceutical preparations, as tablets and pills having a declared standard and intended principally for physicians' prescriptions. Many of these preparations contained one or more such active constituents as opium, morphin, codein, cocain, nux vomica, strychnin, hydrastin, atropin, aconotin, caffein, nitroglycerin, and inorganic medicinal agents. An investigation of these medicinal mixtures has in a number of instances revealed wide variation in the quantity of active medicinal agents represented to be present and that actually found.

A study has been made in detail of the conditions under which these products are manufactured and the difficulties presented in the production of this class of pharmaceuticals.

The examination of a number of samples of crude drugs, fluid extracts, and tinctures shows that the quality of these products are superior to those of previous years. This is no doubt due largely to more efficient and rigid inspection at the ports of entry than heretofore.

An investigation of bitters of the Fernet type has been continued and a number have been found to be of domestic origin, some containing methyl alcohol labeled in a manner to imitate imported products.

As in previous years, a number of proprietary medicines have been found in violation of the law in that drugs required to be declared were either not declared or else improperly stated. In some instances products intended for external use and represented to be harmless contained poisonous mercury compounds. The quality of the hydrogen dioxid upon the market has materially improved, but in many instances the retail packages were found to be below the strength specified in the United States Pharmacopœia. Care in manufacturing, bottling, shipping, and storing no doubt has a marked influence upon the quality of this commodity. A number of pepsin preparations were essentially without proteolytic activity.

IMPORTED DRUGS.

The inspection at the ports of entry during the past year has been more efficient, and the quality of crude drugs permitted entry has been superior to that of previous years.

The importations of ergot, as a whole, offered for entry during the last year were of inferior grade. Many shipments have been found to contain small, shriveled, worm-eaten, and deteriorated ergot. Portions of these shipments were rendered satisfactory by cleaning. A number of shipments of senna siftings were found to contain excessive quantities of sand, dirt, and other foreign material. In some instances it has been found practicable to reduce the ash from about 18 to 9 per cent by subjecting the drug to a process of cleaning. It is of interest to note that the market price of senna siftings is 7½ to 8½ cents per pound, whereas the whole senna leaf (Alexandrian senna) is quoted at 21 to 25 cents a pound.

A number of importations of anise, cardamom, fennel, and coriander have been detained owing to the excess of small gravel, sand, dirt, or foreign seed contained in such products, and a special investigation of the methods of analysis of these products is being conducted in connection with the branch laboratories and the microchemical laboratory. Consignments of uva ursi, buchu, and cubebs containing an excess of stems have been less frequent during the last fiscal year than previously. A number of importations of asafetida have been found adulterated with comparatively cheap foreign gums. As a whole, however, the quality of asafetida has improved materially. Many importations have been found to contain alcohol, soluble matter in excess of the requirements of the United States Pharmacopœia.

Many importations of proprietary medicines have been detained because of the lack of declaration or the incorrect declaration of drugs required to be declared, or misrepresentations regarding constituents and properties of the preparations. Importations of products containing opium, morphin, or codein prepared in the form of confections have been denied entry. The basis for this action is that there is nothing to prevent these attractively flavored products being used as confectionery, and the presence of such drugs as opium, morphin, and codein would render them dangerous to health and in violation of section 11 of the law.

SPECIAL INVESTIGATIONS.

MORPHIN.—Considerable work has been done with a view of devising methods for the determination of morphin generally. The results of this investigation have been encouraging. Some new facts have been brought to light which have led to the development of simple, rapid, and accurate methods for opium, opium preparations, morphin tablets, and the simpler liquid mixtures containing morphin. Further work is being pursued looking toward the application of these methods to sirups and the more complex liquid mixtures. In case of liquids containing glycerin promising results have already been obtained.

In this connection the United States Pharmacopœia method has been studied, with the result that its chief source of error has been definitely traced and a good idea obtained of the magnitude of the error.

CHLOROFORM.—In order to obtain methods for the determination of small amounts of chloroform in medicinal products, a broad study has been made of the reaction velocity between alcoholic potassium hydroxid and chloroform. The information thus gathered has been made use of in routine analyses.

During the last fiscal year investigation has been made for the purpose of securing a method for the determination of nitroglycerin in medicinal tablets. Two methods found in the literature have been successfully adapted to the purpose. Much work based on these methods has been done by various analysts in the division of drugs and the methods have now been made the subject of cooperative work by the Association of Official Agricultural Chemists for the purpose of further testing and, if possible, improving them.

Investigations have been continued upon the keeping qualities of liquid pepsin preparations and to the ricin method of assaying pepsin and testing for small quantities of it in the presence of other substances. Some commercial preparations while retaining nearly their full activity in cold storage lose much of their proteolytic power when stored at room temperature; others are fairly stable even at room temperature. The Jacoby-Solm modification of the ricin assay has been specially studied, and as further modified in this bureau it has been satisfactorily used for the detection of pepsin in chewing gum and in assaying galenicals for pepsin. The method is now being tried out by cooperating chemists throughout the United States, and it will later be submitted to the Association of Official Agricultural Chemists for their consideration.

WASHINGTON FOOD INSPECTION LABORATORY.

The work of the Washington food inspection laboratory during the past year has changed to a certain extent, more than ever turning toward the executive work in connection with the enforcement of the food and drugs act. In fact, at the present time the chief work of this laboratory is the consideration of reports made by the branch laboratories on food products. This work is divided into two parts:

First, interstate cases: All of the analytical reports made by the branch laboratories on food products, with the exception of those reports having to do with flavoring extracts and dairy products. This work requires a study of every analytical report submitted, of which approximately 5,000 were handled during the year. Where the report shows a violation of the law, as in 2,034 instances, a case was prepared for the consideration of the Board of Food and Drug Inspection, hearings were held, testimony considered, and a recommendation was made to the board, with the submission of the evidence available to maintain the action.

Second, the import food cases: About 7,800 analytical reports from the branch laboratories were considered to see whether or not the conclusions reached by the branch laboratories were confirmed. Attention was also given to 741 special cases, representing all of the new points raised under the law and all cases upon which the laboratories are not instructed to act directly with the collector of customs under established precedent. Of these 741 cases, 558 were reported to the Treasury Department as representing adulteration or misbranding under the act and 183 were recommended to the Secretary of Agriculture for release. In each of these 741 cases samples were submitted by the branch laboratories with their reports, and check analyses had to be made before the final action.

Another part of the executive work in connection with the food and drugs act is the distribution of check samples, the receiving and recording of food samples sent to Washington, and the care of seeing that the proper exhibits are sent to the United States attorney concerned in each of the cases reported for prosecution.

MISCELLANEOUS INVESTIGATIONS.

Cider vinegar.—In order to meet certain questions which were raised in a number of vinegar trials during the past year, the work on cider vinegar was extended to the study of the manufacture from the raw material through to the finished product. A field laboratory was established in Lyons, N. Y., in the early fall, and samples of the fresh apple juice made each day through the pressing season were taken and examined. About 250 samples of the fermented cider at various stages and the vinegar made from this cider were also examined, so that now there are complete data upon the changes taking place in fermentation of the fresh apple juice to the final acetification in the generator, on about 1,500,000 gallons of cider made during the past year, and the laboratory is in a better position than ever before to maintain the actions which have been begun under the food and drugs act for the adulteration of cider vinegar.

Malt liquors.—A special study of the composition of malt liquors made on a factory scale from various materials was carried on during the past year to show the effects of the various raw materials used in the manufacture of beer, ales, etc., upon the finished product. Six large breweries cooperated, so that the investigation included seeing the raw materials weighed out and following them through the various steps. Analyses were made of samples taken at various stages, including the fresh wort, the new fermented products, and the finished, matured products as they go on the market. One hundred and thirty-one samples of beers, ales, and worts were analyzed, and as a result the composition of various samples taken on the market can be known with certainty; this information has already proved correct in a number of cases brought under the enforcement of the act.

An investigation has also been made of the methods of manufacture in a large number of such establishments and a study made of the various raw materials used.

GELATIN.—For the investigation of the manufacture of gelatin during the past year arrangements were made with a number of manufacturers of gelatin to allow their methods of manufacture and the effects of various forms of treatment upon the finished product to be studied. The bacteriological laboratory cooperated, giving special attention to the source of bacterial infection during the process of manufacture. A field laboratory was established in first one, then another, large factory where various forms of raw material were used. A careful study has been made regarding the effect of the use of sulphurous acid on the content of bacteria in the finished product and also on the occurrence of harmful metals in the product.

During the last year attention has been given to the addition of arsenic and lead to food incidentally in the method of manufacture and without intention or knowledge of the makers. Arsenic has been found to be added from its presence in coloring matter, shellac, and such products as phosphates by reason of the material from which prepared. Lead is almost universally contained in the tartaric acid on the market, and a study was made of the manufacture of tartaric acid and cream of tartar. The presence of lead was found to be due to the use of lead receptacles and pipes and lead-lined vacuum pans, and to the fact that in the attempt to remove it in the manufacturing establishments the solution to which hydrogen sulphid is added is too concentrated and at too high a temperature.

FOOD COLORS.—A special feature of the work of the food-inspection laboratory has been the examination of colors, especially work on samples where disputes have arisen as to the identity of the coloring matter present. Further, the study of the methods of detection of colors has been continued, and a large number of fruit samples prepared for comparison with samples which are brought in for examination. During the year a set of the coal-tar dyes, which have been used in food products, was prepared and furnished to all the branch laboratories. Much of the time was given up to the study of the identification of the coloring and facing materials used on teas, for the information of the Treasury Department.

The question as to the normal ash content of certain samples of imported red pepper, notably the Spanish pimenton, was raised, and in order to decide whether or not the standard used by the department in judging these products was correct 161 samples were examined, with the result that it was found that the limit on ash was decidedly too low for certain Spanish products which were perfectly normal in their composition; as a result it has been necessary to raise the standard of ash.

BRANCH LABORATORIES.

GENERAL TABULAR STATEMENT.

The 22 branch laboratories maintained at the principal ports of entry for imported food and drug products and at the centers of distribution of domestic food and drug products are concerned principally with the work of enforcement of the food and drugs act.

Since the last report was issued the laboratory at San Juan, P. R., was established and began work in September, 1911.

The following tabulated statement from the reports of the branch laboratories indicates the nature and extent of the work accomplished. Comparison can not be made of the results of individual laboratories because of the varying conditions, size of forces, and periods of time required for routine and court work.

Food and drug samples examined in the various branch laboratories during the fiscal year ended June 30, 1912.

Laboratory.	Imported samples.				Interstate samples.			Miscellaneous samples.	Total samples analyzed.	Hearings.	
	Legal.	Illegal.	Released without prejudice.	Floor inspection samples.	Legal.	Illegal.	Check analysis.			Personal.	By correspondence.
Boston	115	198	270	7,278	308	239	31	128	1,289	322	92
Buffalo	103	35	14	107	102	131	22	89	496	59	120
Chicago	208	196	7	2,870	263	323	72	59	1,128	279	161
Cincinnati	66	6	9	276	260	121	98	84	644	169	142
Denver	22	8	4	44	75	116	10	105	340	22	14
Detroit	43	25	6	258	144	54	14	66	352	51	206
Galveston	18	10	2	116	195	181	2	34	442	4	12
Honolulu[1]	14	48	0	791	0	1	0	3	66	18	26
Kansas City	11	5	1	20	106	192	25	72	412	58	34
Nashville	29	4	......	6	181	100	22	8	344	20	74
New Orleans	139	58	46	3,624	109	169	21	89	631	123	11
New York	4,064	2,307	527	50,272	285	482	269	537	8,471	1,735	1,015
Omaha	......	......	......	....	165	76	4	29	274	24	17
Philadelphia	502	183	70	6,015	103	58	23	85	1,024	229	72
Pittsburgh	21	3	2	95	83	182	23	105	419	53	68
Portland	75	43	4	4,442	101	145	6	124	498	37	13
St. Louis	2	3	......	....	438	591	40	51	1,125	286	156
St. Paul	52	6	1	160	75	117	14	356	621	24	29
San Francisco	407	264	17	14,967	144	169	88	172	1,261	333	128
San Juan[1]	87	56	28	1,241	......	......	......	......	171	81	3
Savannah	256	76	20	128	112	147	8	90	709	10	64
Seattle	101	110	19	3,698	43	30	22	376	701	127	33
Total	6,335	3,644	1,047	96,408	3,292	3,624	814	2,662	21,418	4,064	2,490

[1] For seven months only.

BOSTON LABORATORY.

The work of the Boston laboratory has been about equally divided between the imported and interstate food and drug products.

The study of the arsenic content of shellac and the contamination of foods from this source was continued, and the results obtained were published in Circular 91 of the bureau. At the beginning of this investigation all of the shellac imported contained appreciable quantities of orpiment, the yellow sulphid of arsenic, which was added in India primarily for the purpose of improving the color of the shellac. It is now possible to obtain shellac in commercial quantities free from arsenic.

A milk campaign was carried out at Providence, R. I., in order to determine the character of the interstate milk shipped to that city. About 15 per cent of the samples examined were found to be watered, skimmed, or bacteriologically bad. Twenty-eight of these shippers have paid fines, and a large number of Providence milk cases are still pending.

The traffic of fresh raspberries and blueberries from New Brunswick and Prince Edward Island to Boston, for manufacturers of jam, pie fillings, and similar foods, has seemed to be undesirable from the standpoint of food-law enforcement because of their fermented condition when they arrive in Boston. One of the largest receivers has discontinued the old method of having the berries shipped to Boston and is packing them in a factory on the Maine border, where the fruit may be received in a much more satisfactory condition. It seems to be impracticable to pack the goods at the place of production because of the duty of 35 per cent and 1 cent a pound.

During the past year great improvement has been made by a number of food manufacturers of New England in regard to their factories. Several have moved into new buildings and others have greatly improved existing sanitary conditions. There is an apparent tendency on the part of the higher-grade manufacturers of foods and drugs to get away from the use of artificial colors and preservatives in so far as possible, and a great majority of the food manufacturers and dealers evidence a willingness to cooperate with the department in its enforcement of the law.

CHICAGO LABORATORY.

Food and drug inspection.—The imported foods and drugs received at the port of Chicago consist chiefly of wines and liquors, tea, cheese, olive oil, olives, dried fruits, macaroni, tomato sauce, preserved and tinned fish, cacao, crude drugs, and medicinal beverages. Within the past year the food products most frequently at fault have been Italian cheese made from skimmed milk but not so declared, cordials containing artificial color without declaration, so-called gluten or diabetic biscuits with false or misleading claims, figs unfit for consumption because of worms and excreta, fruit extracts containing artificial flavors, and Dutch cocos without a statement of added alkali. The imported drug products at fault have been chiefly crude drugs not conforming to the United States Pharmacopœia, bitters, and other medicinal preparations without a declaration of alcohol.

The work of this laboratory is largely the examination of interstate food samples and the study of methods pertaining thereto. Among the common forms of adulteration and misbranding which have been detected during the year are the following: Flour bleached to conceal inferiority, condensed milk below standard, eggs decomposed and unfit for food, phosphate and alum baking powders containing arsenic, cream of tartar and cream of tartar baking powders containing lead, so-called egg noodles containing artificial color and but little or no eggs, sweetened coco sold as powdered sweetened chocolate, compounds of coffee, cereals, and chicory improperly labeled, mustard flour adulterated with charlock, ground mace adulterated with Bombay mace, black pepper containing added pepper shells, paprika containing added oil, prepared mustard containing mustard hulls and artificial color, maple products adulterated with cane products, confectionery containing talc and unpermitted colors, misbranded mixtures of olive oil and cottonseed oil, imitation cider vinegar sold as genuine, imitation extracts substituted for true extracts, fruit products variously adulterated with apple juice, improperly declared glucose, acid phosphate of lime, artificial colors, etc.

Investigations.—Methods for the determination of acidity and nitrites in the same weighed portion of flour have been studied and a definite procedure recommended. Studies of methods of detecting chlorin bleaching have also been undertaken. The invention of the homogenizer has led to the manufacture of emulsions of butter, oleo oil, and cottonseed oil, with milk or skim milk, and the substitution of these products for cream, both for table use and the manufacture of ice cream. Examinations made of such products brought out the lack of suitable methods of readily ascertaining the nature of the fact, and to meet this need a method has been devised which has been tested for two years in cooperation with members of the Association of Official Agricultural Chemists with satisfactory results. Certain difficulties have been overcome in the detection of charlock, a weed seed separated from grain grown in the Northwest, extensively used to adulterate mustard flour and prepared mustard. A method of determining vanillin, coumarin, normal lead number and color values of the lead filtrate has been finally perfected and this, together with other methods, has been employed in the analyses of about 100 standard extracts prepared in the laboratory. A process of preparing the solution preliminary to the determination of tin has been developed and certain studies of methods for detecting other heavy metals undertaken.

NEW YORK LABORATORY.

IMPORTED FOODS.—As in previous years, the principal work of the New York laboratory was the inspection and examination of imported food and drug products. During the past fiscal year about 110,000 invoices of food and drug products were examined, from which 6,900 samples were taken and analyzed, an increase of about 1,700 samples over the previous fiscal year.

The examination of figs and black olives has been continued and a great improvement was shown in the quality of both of these products, especially in the figs from Turkey. The examination of green coffee from Java was undertaken, and the so-called "skimmings" were either shipped out of the country or picked and cleaned before being released.

During the year a number of imported insecticides were taken, and a large number of hearings under the insecticide act of 1910 were held on insecticides of domestic manufacture.

WHARF WORK.—At this port more than 50 per cent of the total importations are what are known as wharf examinations, and in the past great difficulty has been experienced by this department in obtaining samples promptly of perishable or semiperishable merchandise. In order to obviate as much as possible this difficulty, a system of wharf examination has been established during the year, two men being assigned especially for this work. This in a measure accounts for the large number of additional samples examined during the past year, and has proved so satisfactory it is hoped during the coming year that the work can be further expanded, so that many examinations of perishable food products, such as chestnuts, black olives, etc., can be made directly on the wharf, and if examination shows the quality satisfactory no official sample will be taken. This will to a certain extent relieve the office force of considerable clerical work.

GELATIN.—Among the substances regularly examined may be mentioned gelatin, which was found in many cases to contain surprisingly large amounts of arsenic. From evidence secured from dealers it seems fairly well established that arsenic enters the gelatin through the raw material from which it is made or from acid used in the process of manufacture. Hides intended for the manufacture of leather are often treated with arsenical preparations in order to destroy the germs of contagious diseases, and when, through accident or carelessness, the trimmings from such material enter the gelatin stock, contamination with arsenic results. As a consequence of the analytical problems resulting from the estimation of arsenic in gelatin and in a great variety of other substances, it was found necessary to evolve rapid and accurate methods for this determination. Existing methods involve a long and tedious destruction of organic matter before the arsenic can be separated and determined. A method has been devised at this laboratory whereby this procedure is replaced by more rapid and accurate processes, and new means have been found by which amounts of arsenic ranging between very small and very large proportions can be conveniently estimated. (See Circular 102, Bureau of Chemistry.) This last process differs from those already in vogue in that the old method provided for the estimation of small amounts, ranging from traces to about 100 parts per 1,000,000, and for amounts greater than one-tenth of 1 per cent. The new method provides for the determination of amounts between the limits just given.

Colors.—Investigation of methods for separating and identifying coal-tar colors in foods has been continued, and much new information on this subject has been obtained.

Vinegar.—The study of vinegar has been continued during the past year by a chemist who has visited various plants where vinegar was made, a thorough examination being conducted of the initial, intermediate, and finished products, with a view to securing such data as will enable analysts to detect the extremely ingenious and sometimes baffling methods of sophistication practiced by some manufacturers. A prominent feature of the vinegar work has been the determination of formic acid in vinegar, adulterated with acetic acid made from pyroligneous acid.

Lead.—The analytical estimation of lead in phosphate and alum baking powders has been studied at this laboratory during the past year with satisfactory results.

A. O. A. C. work.—Members of this laboratory have cooperated with the Association of Official Agricultural Chemists in the study of analytical methods for coffee, coco and chocolate, spices, colors, vinegar, flavoring extracts, heavy metals, moisture, egg noodles, and condiments.

Drug work.—A new drug laboratory was established during the past year and the work in this line has greatly increased. The investigation of asafetida has been continued. Color reactions for the purity of this drug have been established, as well as a quantitative constant in the lead number of the purified resin. The semicarbazid method for benzaldehyde has been elaborated and applied in general to the aromatic aldehydes with satisfactory results. Particular attention has been paid to the estimation of morphin, and the investigation has shown that the morphin sulphate used in hypodermic tablets is usually adulterated with codein. The separation of morphin, codein, and atrophin has been studied and a method devised. The detection of small quantities of quinin in bitters containing chinchona alkaloids has been studied, and the modified thalleoquin reaction was found to be capable of detecting as low as one one-hundredth of a milligram of quinin.

OTHER LABORATORIES.

BUFFALO LABORATORY.—During the year 147 samples of imported foods and drugs were submitted to this laboratory by the ports assigned to its jurisdiction. Conferences have been held with dealers and manufacturers regarding the labeling of their products and inspections made of factory methods. A method for the determination of milk solids in milk chocolate, especially for the estimation of casein, has been modified after an examination of 24 samples of coco butter. Various methods for the determination of fat in dried milk have been tried with some better success than last year. In the study of grape juice it was found that when cane sugar was added to the juice, in a few days much of the sucrose was changed to invert sugar, and after a month all of it was so inverted, thus making it practically impossible for an analyst to state positively from his sugar determinations only that sucrose had been added to the juice.

CINCINNATI LABORATORY.—In addition to the analysis of regular samples, hearings and routine investigations were made of the milk supply of Cincinnati and of the method of manufacture and the chemical properties of maraschino and maraschino cherries.

DENVER LABORATORY.—The studies of commercial vanilla extracts have been continued, a special effort having been made to determine the limits of composition of extracts made according to the United States Pharmacopœia formula, with particular reference to the vanillin content, color value, and the so-called lead number. A practical method has been devised for determining minute quantities of coumarin in the presence of vanillin. (See Circular 95, Bureau of Chemistry.) A promising method for the determination of the amount of oil of peppermint in alcoholic solutions, making use of the refractometer, has been devised. In collaboration with other bureau laboratories studies have been made on the composition of berry fruits sold in the Denver market.

HONOLULU LABORATORY.—The principal work was on oriental imports. Particular attention was given to the labeling of Chinese and Japanese drugs as to alkaloidal, alcoholic, and acetanilid content, and to the use of coal-tar colors in food products.

KANSAS CITY LABORATORY.—A considerable amount of investigation was undertaken on flour bleached with agents other than nitrogen peroxid, and some valuable preliminary results obtained. This work will, however, have to be greatly extended before definite conclusions can be drawn.

NEW ORLEANS LABORATORY.—A few of the Italian importers of New Orleans have been adding about 30 per cent of cottonseed oil to their imported olive oil after it has passed the inspection of this laboratory and selling it locally as pure olive oil. Since the discovery of this practice all olive-oil importations have been reported to the State food commissioner as soon as the inspection by this laboratory is completed.

OMAHA LABORATORY.—During the months of July, August, and September, 1911, the regular force of this laboratory with additional assistants was engaged in the special egg investigation conducted at Omaha by the food research laboratory. In April, 1912, preparations were made for resuming this work, which commenced in May and continued throughout May and June.

PHILADELPHIA LABORATORY.—During the year certain investigations have been carried on, among which were studies of the best methods of estimation of crude fiber in prepared mustard and examination of certain samples of paprika pods of known history for the purpose of obtaining data of value in the detection of added oil. Various types of cherry products obtained from wild and cultivated and the maraschino cherry, both commercial and of known origin, some home made, have been examined during the year, in order that the composition of various cherry products could be determined. In the course of the examination of some of these commercial samples one product sold as wild cherry was found to contain considerable quantities of formic acid, which was undoubtedly added as preservative. Investigations were also made on methods for the separation and identification of coal-tar colors in mixtures and on various flavoring extracts of known composition. A considerable amount of time throughout the year was required in obtaining evidence regarding the views of the trade on ingredients, methods of manufacture, etc., on "Apricot cordial" and "Best quality white syrup;" also as to the meaning of the term "Mocha" coffee as it is understood at the present time among wholesale grocers. During June a small milk campaign was conducted, in which about 100 samples of milk, which had been in interstate commerce and intended for consumption in Philadelphia, were examined; the milk was generally a very high grade, and only a few samples were found to which objection could be made.

Owing to the shortage of the potato crop last year vast quantities of potatoes were imported through this port during the winter and spring from Ireland and Scotland, and the laboratory was required to condemn large quantities of potatoes, which had been frozen either on the boats or on the piers before delivery or had rotted in transit. During the year at various times chemists from Washington were stationed here temporarily for the purpose of conducting certain investigations into the methods of manufacture, ingredients, and composition of beer, particularly all malt beer made without the use of any malt substitutes. The manufacture of gelatin was investigated in somewhat the same manner.

PITTSBURGH LABORATORY.—A number of samples were examined for the Treasury Department and assistance given the Post Office Department in a drug case which involved the use of the mails for fraudulent purposes. The offender in this case received both a fine and jail sentence. Cooperation with the internal-revenue department resulted in the seizure by this department of a quantity of so-called temperance beer shipped into dry territory and the securing of a number of cases against the offenders by this department, these products being beer under another name. Assistance was rendered the Pennsylvania State authorities against varnished candies and has resulted in their elimination from the markets of this State, the fudges which were the principal kind of candies varnished having now the natural dull appearance due to the ingredients used. A few samples of candy varnished with shellac were found to contain a small amount of arsenic in the varnish, the arsenic being added as sulphid in India for the purpose of coloring the product. A considerable number of fermented and distilled liqueurs and cordials were examined. A striking feature of the examination of the products submitted showed nearly all of them in violation of the law, the greater part of these being labeled in a manner implying that they were of foreign production when they were not.

PORTLAND LABORATORY.—Special work included: A study of methods submitted by the Treasury Department for detection of color and facing in tea, a study of the method for the detection of pepsin in gum, a study of the manufacture of vinegar at Salem, Oreg., and cooperative work on fruits.

ST. LOUIS LABORATORY.—During the year a certain amount of work was done at the request of the purchasing commissary of the United States Army, and cordial relations have been maintained between the two departments. A certain amount of work has also been done and various consultations held for the Internal-Revenue Division of the Treasury Department, aiding them to quicker action in cases which might be pending.

SAN FRANCISCO LABORATORY.—The work of the San Francisco laboratory during the year has been of a different character than that of the preceding year in that the subject of oriental proprietary medicines has been under investigation. Of the imported samples, 36 per cent were oriental drugs, and 40 per cent of the oriental drug samples examined were found to be illegal. Twenty per cent of the import samples examined were made up of tea, examined for coloring and facing. Of the domestic samples fruit products, fermented and distilled liquors, flavoring extracts, and saccharine products constitute the major portion. A number of analyses have been made of typical California fruits of varying degrees of ripeness to note their change in composition. During the latter part of the year the time of one man has been devoted to the analyses of fruits in connection with the experimental cannery established in San Francisco for the study of fruit-canning problems peculiar to California. A preliminary report on the nature and composition of gases given off by roasted coffee has been prepared, the investigation not being fully completed at this time. An investigation into a method for the separation of sound oranges from frozen oranges, based upon the specific gravity of the fruit, was undertaken, and considerable data collected, but with results which indicate that a commercial method for the positive separation of frozen from sound fruit is impracticable. A special investigation of all the breweries within the city of San Francisco was carried out to decide certain questions relative to what the brewers considered to be the proper raw materials with which beer should be made.

SAVANNAH LABORATORY.—A number of samples were examined for local branches of the War and Treasury Departments and two special investigations were begun which have not yet been completed. In the late spring a preliminary investigation of the oyster canning industry in the vicinity of Savannah was undertaken for the purpose of looking into the sanitary conditions, source of supply of raw material, and collecting data connected with the canning of oysters. Because of the suspected relationship between spoiled corn and pellagra, and the impossibility of the average consumer distinguishing meal made from spoiled corn from that made from sound corn, an examination of the meals and grits offered for sale in the Southern States has recently been undertaken. The results show that 100 per cent of the meals examined had undoubtedly been made from spoiled corn, although in appearance they could not be told from meal made from sound corn.

SEATTLE LABORATORY.—The analytical studies and investigations included the changes in composition of fresh fruits (raspberries) due to keeping, the composition of noodles with varying egg content, cooperative work for the Association of Official Agricultural Chemists on heavy metals in foods, especially tin, and on headache mixtures, camphor, and food colors, composition of soy-bean products, and the canning of salmon.

EXAMINATION OF DAIRY PRODUCTS.

The work of the dairy laboratory, as in previous years, has covered the entire range of dairy products, including other articles closely related thereto, such as ice-cream thickeners or fillers, butter colors and flavors, malted milks, lactated infant foods, and other articles of minor importance. The total number of samples examined was 422, of which 372 were official interstate and import samples, the remaining 50 being of miscellaneous origin and consisting chiefly of samples examined for other departments of the Government. A classified list of the samples examined is as follows:

Evaporated milks	129
Sweetened condensed milks	39
Cheese	84
Butter	64
Dry milks	14
Fresh milks	37
Cream	21
Oleomargarins	12
Ice creams	3
Ice-cream thickeners	5
Malted milks and lactated foods	4
Miscellaneous, butter colors, butter flavors, artificial cream, etc	10
Total	422

The greater part of the work under the food law during the year was upon evaporated, condensed, fresh and dry milks, cheese, and butter. In canned evaporated milks the most common fault is that of low concentration—thin milk. Several shipments have been seized because of low concentration and the goods condemned by the court.

A number of prosecutions have been brought on the misbranding of American cheddar cheese, showing excessive shortage in weight. The stenciled or pencil-marked weights placed on the boxes at the factory are too often assumed to be correct, without check or modification, even after the product has been for months in storage. Even if the factory weights were originally correct, which should not be blindly assumed, it is evident that a considerable shortage may occur when goods fresh from the factory are stored for several months and then sold on the original marked weights.

Another form of misbranding cheese is found in the labeling of "skims" or "part skims." In two cases the term "light skim" was made use of in labeling cheese from which two-thirds or three-fourths of the fat had been removed from the milk at the time of manufacture of the cheese. In other cases "part skims" were sold as "full creams," or simply as "cheese," which is the same thing.

The sale of bulk condensed milk, both sweetened and unsweetened, that has been skimmed or partly skimmed for genuine condensed milk is still a more or less common practice.

Violations of the law in the butter trade consist mostly of the sale of butter containing an excessive amount of water, the substitution of oleomargarin for butter, and sometimes the sale of short-weight butter in pound prints.

A classified list of the cases prepared by this laboratory is as follows:

Milks and creams	157
Cheese	61
Evaporated milks	32
Ice creams	3
Sweetened condensed milks	13
Butter	16
Total	282

Of these 114 were prepared from analyses made in the branch laboratories of fresh milks, condensed milks, cheese, and butter. As usual, work has been done in the study of methods for the analysis of dairy products.

The decrease in the number of samples examined during the year is accounted for in a great measure by the small laboratory force for more than one-third of the year, due to two resignations.

SPECIAL INVESTIGATIONS.

PHYSICAL CHEMISTRY.

During the past year the study of an improved method for estimating sugar in foods and drugs by the use of the enzym invertase has been continued, with good results. A large number of analyses and measurements have been made, and the use of invertase, which was favorably commented upon in the last report, has proved to be the best method for determining sugar in these products. A study of the occurrence of cane sugar in honey, in which invertase was used for the estimation, has shown that the amount of sugar in genuine honeys is considerably lower than has been heretofore supposed. Other studies included the chemical properties of the sugar raffinose, which occurs in many foods and drugs, a method for obtaining this sugar from cottonseed meal, and a method for estimating maltose and lactose in foods and drugs.

In March a study of the physical and chemical problems involved in the commercial manufacture of candy was begun and is now in progress. The causes for the aging of candy, which in some cases involves chemical changes producing rancidity and in others only physical changes, such as granulation of the sugar and hardening of the candy, are being investigated, as well as the influence of glucose, invert sugar, and like substances upon the character and keeping qualities of all of the common types of candy.

PLANT PHYSIOLOGICAL CHEMISTRY.

The work of the Laboratory of Plant Physiological Chemistry has been continued along practically the same lines as in former years. Besides the extensive collaborations with the various offices of the Bureau of Plant Industry, an extensive investigation of the methods of baking bread and of the conditions of the bake shops of the large cities in this country has been begun. An investigation has also been undertaken of the use of coloring matter in macaroni and the differences between macaronis made from different classes of flour.

Over 1,200 samples have been received in this laboratory during the past year, 600 being cereals, 300 flours, 40 macaronis, 120 other cereal products, 50 of foliage, 60 of beet roots, practically 100 of alkaline extracts, and over 100 miscellaneous samples, such as soy beans, hay, blueberry stems, etc. The work on these samples has necessitated the making of about 15,000 determinations.

Bulletin 138 gives the results of a study of the changes in composition which the wheat seed undergoes during the first two or three weeks of germination and growth, while Bulletin 149 gives the results of growing wheat seedlings in solutions of various degrees of acidity and alkalinity. This latter bulletin has a practical agricultural value in explaining why soils treated with ammonium sulphate, potassium chlorid, potassium sulphate, and similar substances become acid and refuse to remain productive unless a sufficient amount of lime is added to neutralize the acidity.

Much work has been done on methods of determining the amounts of cholin in ordinary flour and in cottonseed flour. This work may be useful later to show why cottonseed has been regarded as poisonous to young cattle and hogs.

Other subjects investigated have included starch and starch products, potato drying, graham flour, and canning tomatoes.

ANIMAL PHYSIOLOGICAL CHEMISTRY.

The work of this laboratory during the past fiscal year has greatly increased over that of the preceding year. There were 669 samples examined, as follows: One hundred and fifty-six of eggs, 396 pertaining to the infant food and cottonseed bread studies, 56 of fish, including canned salmon, sardines, and shad, 11 of meat extracts and bouillon cubes, 28 of gelatin, and 22 of a miscellaneous character, including work to determine evidence that potato chips had been peptonized, the analysis of so-called concentrated food preparations containing meat and chocolate, and the examination of oysters for evidence of decomposition.

The work on the analysis and study of the different brands of infant foods is nearing completion. A number of charts, which were made showing the composition of the different foods prepared according to the directions accompanying each, have been in demand throughout the country in connection with exhibitions on the care of infants and infant feeding.

The work on deterioration and decomposition of foods was devoted largely to studies on eggs. Assistance was rendered in the investigation conducted at Omaha, Nebr., last year and during this season work is being conducted at a plant in Wichita, Kans., to secure data on desiccated eggs. Work of the same nature was done on samples of reprocessed or "do over" salmon and inferior grades of sardines.

Progress has been made in the study of the manufacture and the chemical composition of gelatin in collaboration with the Washington Food Inspection Laboratory. In collaboration with the Laboratory of Plant Physiological Chemistry a series of feeding experiments with bread on white rats and mice was started. Bread baked from ordinary white flour, graham flour, and bread containing different percentages of cottonseed meal were employed in the experiments, which were controlled by the analysis of the breads, weights of the animals, and the analysis and histological examination of the animals that died during the tests and of those killed at the conclusion.

MICROCHEMICAL EXAMINATIONS.

The microchemical investigations during the past fiscal year have been similar in character to those carried on in previous years, consisting largely of microscopical examination of samples. The volume of work performed, however, has been very much lessened through the resignation of two analysts and because of the time consumed in the preparation and presentation of evidence in connection with cases tried under the food and drugs act.

Certain investigations, however, have been conducted in the nature of spoilage of fruits and fruit products, nuts, and similar substances, which, through careless handling, may have been seriously affected. In the line of investigation of fruits visits were made to a few factories where such products were being packed, observations were made as to the kinds of fruits used and the process of handling, and samples of the finished product were examined microscopically. From this work as a basis, standards for judging such products were obtained.

The work begun last year upon the subject of insect powder for the determination of the amount of stem present in normal pyrethrum has been continued as far as time available for such work would allow. A trip was made to an establishment where the flowers were being ground, and samples were taken of the product before and after milling for the purpose of obtaining standards from which to judge of the amount of stem present in unknown samples.

During the fall of 1911, at the request of the Treasury Department, an investigation was begun on the question of detection of coloring matter and facing on teas. This investigation showed that a great proportion of tea was artificially colored or faced and resulted in the devising of a new method, which has, with certain slight modifications, been adopted as the official method of the tea testers of the Treasury Department.

The microscopical examination of proprietary, infant, and invalid foods in collaboration with the section of animal physiological chemistry has been in progress and many samples have been examined. It has been shown that the microscopical examination of these products gives information, not only as to the ingredients used, but also as to the method of manufacture and incorporation of the ingredients.

The work on drugs included an interesting sophistication of cardamom seed, in which many of the seeds were coated with clay, and quite a large portion of the substance was composed of gravel and what appeared to be bastard cardamom. A large number of samples of various drugs have been examined during the year to determine the amount of foreign material present, the results to be used as a basis for arriving at standards for these products. Among the drugs examined to determine the amount of foreign material present should be mentioned, in addition to cardamom, senna, buchu, coriander, and juniper berries.

The routine work has included the examination of a wide range of substances, the largest single item being that of paper. The examination of contract materials has included such materials as fabrics, insect powders, typewriter ribbons, scouring powders, and cotton wastes, this work being done usually at the request of other departments of the Government in collaboration with other laboratories in this bureau. A large number of fabrics, teas, coffees, and spices have been examined for the General Supply Committee.

The work performed under the food and drugs act included the examination of a wide range of substances, among which might be mentioned spices, jams, jellies and preserves, cattle foods, eggs, nuts, sausages, mincemeats, various dried fruits, olives, candies, chocolate and coco products, corn, peas, beans, etc.

Below is given a tabulated list of the number and kind of samples examined during the past year:

Miscellaneous samples:		
Papers	1,979	
Foods (chocolate, tomato ketchup, nuts, figs, spices, olives, tea, coffee, etc.)	573	
Drugs	231	
Textiles	100	
Typewriter ribbons	35	
Cattle foods	21	
Insect powders	20	
Scouring powders, etc	13	
Miscellaneous	22	
Dextrin, miscellaneous foods, etc	72	
Total		3,066
Interstate samples:		
Drugs	149	
Tomato products (pulp, ketchup, etc.)	356	
Jams, jellies, etc	67	
Spices	38	
Coffee, chocolate, coco, tea, etc	51	
Cattle foods	218	
Eggs	65	
Nuts	53	
Sausage, mincemeat	34	
Miscellaneous fruits (apples, peaches, cherries, prunes, currants, figs, raisins, etc.)	112	
Starchy foods and seeds (biscuit, bread, rice cakes, corn, peas, beans, etc.)	25	
Miscellaneous	65	
Insecticides	65	
Total		1,298
Total for year		4,364

ENOLOGICAL CHEMICAL RESEARCH.

The work of this section for the past year has been chiefly along the following lines:

(1) The continuation of the examination of ripe grapes to determine their normal composition. The samples were collected in New York, Pennsylvania, Ohio, and Michigan in the northern grape belt and Virginia in the southern, both from the vineyards and from the factories which make unfermented juice and wines. Two hundred samples of fruit were examined and 1,440 determinations were made.

(2) The study of the composition of grapes for a period of several weeks during ripening. For this work representative plants of the more important varieties used for grape juice and wine, as Catawba, Clinton, Concord, Cynthiana, Delaware, and Norton, were selected and the fruit held intact for the purposes of this investigation. The period of study covered about 12 weeks, 147 samples being examined, comprising 3,381 determinations. The work on the above two lines, coupled with the previous investigation on grapes, resulted in securing valuable data for use as a basis in detecting sophistication of the food products made from grapes.

(3) The study of the composition of apples has been continued and is nearing completion. One hundred and ninety-two samples were examined during the year, comprising 2,658 determinations.

(4) The study of the normal composition of pure wines made from native grapes in this laboratory has received more attention than any other subject during the year. Twelve additional samples were made during the fall of 1911 from standard varieties used for vintage purposes for a special study on the acid elements of the fruit, young wine, and dry wine. The chemical work required 1,136 determinations. Of the wines made in this laboratory in former years 79 samples have been held for critical study on the normal composition both of the organic and inorganic elements, requiring 4,896 determinations. It appears from this work that certain elements, especially in the composition of the ash, are so constant in amount as to furnish very reliable data for the detection of fraudulent articles.

(5) Thirty-nine samples of commercial wine and grape juices have been analyzed for technical studies of their composition. The chemical data comprise 1,014 determinations.

(6) During the past three years much attention has been given to detecting errors in methods for the analytical work necessary on the samples handled in this laboratory. This has resulted in important modifications of the methods now in use for determining tartaric acid, cream of tartar, malic acid, and acid bound to alkaline earths.

(7) The studies with yeast organisms for the year comprised incubator studies to determine fermenting power at low temperature. Three hundred and fifty-two determinations were made on 32 samples.

MISCELLANEOUS INVESTIGATIONS.

WORK OF THE MISCELLANEOUS DIVISION.

The miscellaneous division conducts the examinations of waters, insecticides and fungicides, cattle foods, grains, trade wastes, and hygienic and miscellaneous samples and research work along these lines.

The administrative work and correspondence, especially that relating to the enforcement of the food and drugs act in so far as it applies to waters, cattle foods, and remedies and grains, and the preparation of cases involving the above-mentioned products, have required a large amount of attention from the chief of the division, who is also a member of the Insecticide and Fungicide Board, which has charge of the enforcement of the insecticide act of 1910. Work in connection with this board has occupied about one-third of the time of the chief throughout the year. Some time has been given to travel in connection with inspections of water plants and attending meetings of societies which have for their aim the advancement of science in so far as it applies to the substances considered in this division.

The miscellaneous division during the past year examined approximately 2.105 routine samples, besides a large number in connection with special investigations. Many of the samples required 20 to 30 individual determinations, and few of them required less than 8, so that probably about 25,000 individual determinations were made. In the following table appears a statement which shows in a concise form the number of samples of various materials examined:

Import mineral and table waters	43
Domestic mineral and table waters	202
Miscellaneous samples, principally waters	222
Imported cattle and poultry feeds and grains	2
Domestic cattle and poultry feeds and grains	502
Miscellaneous cattle feeds and grains	729
Import insecticides and fungicides	25
Domestic insecticides and fungicides	293
Miscellaneous and hygienic samples, principally insecticides and fungicides	87
Total	2,105

In conformity with the policy of the Bureau of Chemistry to perform work from other departments of the Government and for other bureaus of the Department of Agriculture when such work is requested, many of the above-mentioned samples represent collaborative work of this character. Following is a concise statement of work performed for other departments, offices, or bureaus:

War Department	97
Department of Commerce and Labor	5
Members of Congress	6
Department of Agriculture:	
Bureau of Plant Industry	724
Bureau of Entomology	40
Forest Service	20
Bureau of Animal Industry	9
Office of Experiment Stations	10
Total	911

Besides the above classified samples the division examined 54 samples for other divisions and laboratories of the Bureau of Chemistry and different branches of the Government service.

WATER LABORATORY.

During the year the water laboratory examined 467 samples, classified as follows:

Interstate samples	202
Foreign samples	43
Miscellaneous samples	222

Of the 202 interstate samples, 18 were found to be adulterated and misbranded and 2 seizures were made. Of the 43 foreign samples, 8 were found to be misbranded and their exclusion from the United States recommended. The miscellaneous samples examined for this department or other branches of the Government service were received from:

Members of Congress	6
Department of Commerce and Labor	5
War Department	4
Office of Experiment Stations	10
Forest Service	7
Bureau of Plant Industry	7
Unlisted	5

Investigations of mineral springs at source have been continued and the collection of the data of the springs of New York, New Jersey, and Pennsylvania has been completed.

An investigation of considerable magnitude was undertaken in collaboration with the bacteriological laboratory for the purpose of determining the character and source of pollution of the Potomac River and the effect of such pollution upon oysters and other shellfish. This work involved the examination of 133 samples of water and two trips down the river in the effort to determine the probable sources of contamination.

Investigation of the radioactivity of certain mineral waters has been continued, with special study of some of the Virginia mineral springs. A limited amount of time has been devoted in collaboration with other chemists of the Association of Official Agricultural Chemists to a study of methods for the analysis of water for sanitary, technical, and industrial purposes, report of which work was published in the proceedings for 1911. The investigation of the character of certain chemicals used in water purification and of their effect from hygienic and sanitary standpoints has been carried on.

The study of methods for the determination of lithium which has been in progress for the past three or four years has been brought to final completion, and the data obtained have been collated and published as Bulletin 153 of this bureau.

INSECTICIDES AND FUNGICIDES.

The composition and methods of manufacture of insecticides and fungicides, as well as the effect they have on foliage, are studied with the idea of increasing their efficiency and suggesting methods of avoiding injury to vegetation, and also of suggesting to the farmer or fruit grower how such products may be prepared. Investigations to improve and discover new insecticides are always under way, and methods of analyzing the various materials of this nature are being studied and any improvements made therein are adopted.

Besides making analyses of insecticides and fungicides for other bureaus of the department when requested, this laboratory is also charged with the chemical examination of insecticide and fungicide samples (other than cattle dips and related products) for the Insecticide and Fungicide Board in connection with the enforcement of the insecticide act of 1910.

During the year 405 samples were analyzed, many at the request of other bureaus, as follows:

Bureau of Entomology		40
Bureau of Plant Industry		25
Other laboratories and divisions of the Bureau of Chemistry and miscellaneous		22
Insecticide and Fungicide Board:		
Domestic samples, official	259	
Domestic samples, unofficial	34	
Foreign or import samples	25	
		318
Total		405

Of the 259 official samples examined for the Insecticide and Fungicide Board, each representing interstate shipments of insecticides and fungicides, 131, or a little over 50 per cent, were recommended for prosecution, due to their being adulterated or misbranded, or both, under the insecticide act of 1910. Of the 25 foreign or import samples 14, or 56 per cent, were recommended to be detained at the port of entry for the same reason.

Numerous other products were examined, such as vegetables, fruits, foliage, and plants which had been treated with insecticides and fungicides, fruits, hops, and other materials used in the preparation of foods which may have been affected as a result of the application of insecticides, etc. An investigation relative to the toxic effect on fruit trees of certain elements, notably copper and arsenic which may accumulate in the soil as the result of using compounds containing these substances as sprays, has been under way for two years. The chemical work in connection with this investigation is now practically completed. A study of the solubility of Paris green in water is being carried on for the Insecticide and Fungicide Board in cooperation with members of the Bureau of Plant Industry and Entomology.

Methods for the analysis of lime-sulphur solution, Bordeaux mixture, Bordeaux lead arsenate paste, and various insecticides used for household pests have been given especial attention and accurate methods of analysis have been developed. About 300 to 400 individual determinations of the constituents of some of the common insecticides have been made in collaboration with other chemists of the Association of Official Agricultural Chemists during the course of a study of improved methods of analysis of these products.

Orchard tests with numerous insecticidal materials have been continued during the year to determine the cause of the injurious effects of such materials on foliage and to discover some way of overcoming the difficulty or some new effective compound that may be used on such tender foliage as the peach without causing injury.

CATTLE FOOD AND GRAIN INVESTIGATION LABORATORY.

The laboratory considered during the year a total of 1,233 samples, requiring approximately 7,800 separate determinations and including samples of cattle and poultry foods, both foreign and domestic, examined under the provisions of the food and drugs act, as well as samples taken and examined for the solving of various economic problems, such as the feeding value of forage crops and the composition and value of various grains and cereals. A large number of samples were examined for the Bureau of Plant Industry in pursuance of their study of the deterioration of corn in storage. Studies of various methods of determining the constituents of cattle food and grains and improvements in apparatus were made.

Five hundred and four samples were taken in connection with the pure food and drugs act; of these 89 were found to be adulterated or misbranded. The distribution of the total number of samples analyzed was as follows:

Imported cattle foods and grains	2
Domestic cattle foods and grains	502
Miscellaneous cattle foods and grains	729
Total	1,233

The distribution showing cooperative work is as follows:

War Department	93
Agriculture Department:	
Forest Service	13
Bureau of Plant Industry	692
Bureau of Animal Industry	9
Other laboratories of the Bureau of Chemistry	18
Miscellaneous	9

TRADE WASTES LABORATORY.

This laboratory is organized for the purpose of studying the effects of trade wastes on agricultural products, on fruits, and on cattle. Particular attention has in the past been given to the effect of smelter wastes, the work being done at the request of the Department of Justice and in collaboration with the Forest Service. During the past year no work along this line has been requested, so the force engaged therein has been used for other pressing work of the division. A great deal of miscellaneous and hygienic work has been carried on by the different laboratories mentioned above.

EXAMINATION OF CONTRACT SUPPLIES.

The work of the contracts laboratory during the past year has been very similar to that of preceding years. The constant demand for results of examinations at the earliest possible moment leaves little or no time for systematic research. The greater part of the work of the laboratory has been the testing of miscellaneous contract supplies and the preparation and modification of specifications. Work has been continued on the study of the properties of rubber goods, with a view of drawing up specifications for this class of material, but the problem is an exceedingly difficult one, and from the unsatisfactory results obtained so far and the great lack of agreement among rubber experts on the proper interpretation of results of tests it has not as yet been deemed advisable to issue any specifications.

The investigation of paint materials and the work of inaugurating a very comprehensive series of white-paint tests in cooperation with the American Society of Testing Materials and the Bureau of Standards have progressed well. It is believed that the actual exposure will be started on the Arlington farm early in the coming fiscal year.

Work has been continued on platinum laboratory utensils and on enamel-ware cooking utensils. The methods of testing inks and typewriter ribbons have been given much study and, it is believed, have been considerably improved.

Publications from this laboratory during the year have covered the subjects of the refractive index of beeswax (Bureau of Chemistry Circular 86), the fluorescent test for mineral and rosin oils (Circular 84), the calcium-carbid method for determining moisture (Circular 97), and the use of paint on the farm (Farmers' Bulletin 474).

Two thousand four hundred and forty-two samples have been examined for the various Government departments. The attached table shows the distribution of the work according to the material examined and the departments for which the examinations were made. In addition to the samples reported in the table, over 1,800 pieces of apparatus were examined for the Bureau of Chemistry.

Number and distribution of samples of contract supplies analyzed in 1912.

Distribution.	Colors, paints, varnishes, etc.	Oils, greases, and waxes.	Soap and candles.	Miscellaneous.	Inks.	Chemicals.	Glues and adhesives.	Metals and alloys.	Rubber.	Typewriter ribbons.	Total.
General Supply Committee	415	63	220	109	108	29	79	......	....	250	1,273
Isthmian Canal Commission	213	170	27	56	6	65	......	......	....	......	537
Treasury Department[1]	108	10	26	16	2	.....	11	34	....	1	208
Agricultural Department[2]	3	31	29	58	.....	3	1	......	27	17	169
Post Office Department	14	2	35	7	43	.....	12	......	....	4	117
War Department	2	23	1	.....	.....	.....	......	......	....	......	26
Commissioners, District of Columbia	5	3	14	1	9	1	......	......	....	......	33
Government Printing Office	......	2	......	2	.....	.....	1	......	....	......	5
Department of Commerce and Labor	5	......	20	3	3	2	......	......	....	......	33
Navy Department	3	2	9	.....	.....	.....	......	......	....	......	14
Smithsonian Institution[3]	......	7	......	.....	.....	.....	......	......	....	......	7
Superintendent of Capitol	1	......	......	.....	.....	.....	......	......	....	......	1
Department of the Interior	......	3	4	2	.....	.....	......	......	....	10	19
	769	316	385	254	171	100	104	34	27	282	2,442

[1] Including Bureau of Engraving and Printing.
[2] Including Bureau of Chemistry.
[3] Including National Museum and National Zoological Park.

INVESTIGATIONS OF THE LEATHER AND PAPER LABORATORY.

LEATHER.

The work on sole leather mentioned in the last year's report has been extended to embrace a number of other samples of more recent production, and the results have been prepared for publication. Much work has been done on bookbinding, carriage, automobile, and furniture leathers, showing that the same harmful practices which are prevalent in the tanning of sole and other heavy leathers exist among the producers of these leathers. The effort to produce leathers of even, bright colors and of pleasing general appearance has led to the use of materials which are exceedingly harmful to the product. Bookbinding leathers should have extraordinary durability, because of their constant use and the cost of rebinding. So unsatisfactory have leather bindings been found, that in recent years a tendency has developed to substitute cloth bindings, which may prove more durable than the leathers which have been prepared through the use of harmful materials or processes. The same reasons for good quality apply to furniture, carriage, and automobile leathers, especially to the last. Automobiles are subjected to very rough usage and exposure to alternate sunshine and rain. Under such conditions the harmful effect of acids or other injurious materials is greatly accelerated, and the leather rapidly decays, becomes useless, and must be replaced. Generalized specifications for bookbinding leathers for Government publications have been forwarded to the Public Printer, who is making an effort to secure leathers which will comply in general with these specifications and be free from the materials which experience has proved detrimental.

PAPER AND PAPER-MAKING MATERIALS.

Experiments have been continued on the utilization of waste longleaf pine for the making of paper and the recovery of wood turpentine, rosin oils, and wood creosote. These results confirm the opinion formerly expressed by the bureau that the utilization of the waste pine timber of the South from the cut-over lands is one of the most promising fields of industrial development which exists in the country. Bulletin 159 gives the results.

The work on a new method of cooking with gaseous chemicals has been continued as opportunity offered. Cooperative work with the Post Office Department through our laboratory at Dayton, Ohio, has been continued with satisfactory results. Routine work is also being done for the Post Office Department, the Bureau of Engraving and Printing, and the General Supply Committee in the testing of paper bought on contract and in the testing of samples for contract supplies. The chief of the laboratory has served with the Committee on Paper Specifications to the Joint Committee on Printing of Congress in the preparation of specifications and proposals for paper bought by the Government Printing Office. The report of this committee, which followed in general the lines suggested in Report 89 of the Secretary's office, was printed and adopted and the papers of the Government Printing Office are now bought in compliance therewith.

TURPENTINE AND ROSIN.

Standard, nonfading type samples for rosin have been devised. It is believed that the use of these type samples—which should be certified or at least checked by the Government, as millions of dollars change hands annually on the grading of rosin—will greatly promote the correct grading of rosin and at the same time prove more economical to the official graders. An instrument has been devised whereby the producer of rosin can easily grade his rosin at the still and thus know before shipment what grade of rosin he is sending to market. Circular 100 describes the apparatus and the manner in which it is used.

For a great many years turpentine has been sold on the great turpentine markets of this country on the basis of its color according to standards prepared by the naval stores committee of the New York Board of Trade and accepted by the largest primary naval stores market of the world, Savannah. Examination of a number of the standard-type samples for turpentine has shown that different sets of these type samples do not agree closely in color. It is highly important that the standard-type samples should always remain the same from year to year, or at least that type samples can be replaced yearly with the full assurance that the color is the same as that previously used; therefore efforts are being made to get the primary naval stores markets to adopt specified colors which can always be duplicated by this bureau and which can be checked from time to time and certified to by the department, much as the cotton standards are now certified to by the department.

The work on production of wood turpentine, its refining, its value as a paint and varnish thinner, and its effect upon the workmen using it in paints has been continued in the laboratory, and the information thus obtained will be used in more extended experiments during the coming year.

MISCELLANEOUS WORK.

The testing of deliveries of papers, textiles, leather, turpentine, rosin, and other materials for the several Federal departments is being continued as heretofore and requires much of the time of the laboratory force. Miscellaneous samples, including fertilizers, phosphate, wastes, and other industrial materials have been examined at the request of the departments and of other bureaus of this department, and the laboratory is cooperating in the study of methods for the examination of leather and tanning materials. The work on the determination of iron and aluminum in phosphate has practically reached a successful conclusion. Various Government departments are adopting the specifications for paper, leather, etc., which are recommended by the laboratory, and other laboratories of the Government are following the lead of this department and have prepared to do testing which for many years was conducted only by this bureau. It is hoped that in the future the various Federal departments and other agencies will make even larger use of the experience and facilities of the laboratory.

The number of samples examined during the past year, including those examined in the laboratory at Dayton, Ohio, are as follows:

Paper and paper-making materials:	
Washington laboratory	2,915
Dayton, Ohio, laboratory	3,165
Textiles	194
Turpentines and rosins	209
Leather and tanning materials	148
Miscellaneous	81
Total	6,712

NITROGEN WORK.

A laboratory is especially equipped for determining nitrogen and to it are referred all samples on which this determination is to be made. A total of 11,885 such analyses were made in the past fiscal year, the samples being referred not only from the laboratories of this bureau but from other bureaus of this department and also from other departments, as follows:

Department of Agriculture:	
Bureau of Plant Industry	1,718
Bureau of Soils	208
Bureau of Animal Industry	18
Office of Experiment Stations	2
Forestry Service	24
General supply committee	12
War Department	18
Isthmian Canal Commission	12
Treasury Department, Bureau of Engraving and Printing	42
Government Printing Office	74
Post Office Department	14
Total	2,142

The laboratory has also continued to collaborate with other nitrogen chemists in studies for the improvement of the present methods of analysis.

PUBLICATIONS AND PRINTING.

The following publications have been submitted to the Secretary and sent to press during the past year: Sixteen bulletins (1,051 pages), 24 circulars (212 pages), 3 unnumbered circulars (107 pages), 2 farmers' bulletins (62 pages), 1 Yearbook article (12 pages), 8 food-inspection decisions (9 pages), and 642 notices of judgment (1,143 pages, received from the Office of the Solicitor), making a total of 3,039 pages of new material published.

The food-inspection decisions included Nos. 139 to 146 and covered rulings on sweet oil, vinegars, maraschino cherries, saccharin, candied citron, canned foods, and bleached oats. The subjects of special interest treated in the bulletins are the processing of persimmons, production of wood turpentine, growth of wheat seedlings, elimination and toxicity of caffein, enological studies, and canning of foods. The circulars cover a wide range of chemical investigations, as tests for mineral oils, determination of citric and malic acids, estimation of arsenic, grading of rosin at the still, studies on chicken fat and on eggs (fresh, frozen, and dried), and investigations of beeswax, mixtures of certain acid coal-tar dyes, American spearmint oil, gum tragacanth, coumarin, marking porcelain and silica crucibles, measurement of the translucency of papers, and calcium-carbid method for determining moisture.

There were issued 173 requests for job printing, covering all stationery supplies, forms, circular letters, etc., and 223 requests on the photographic laboratory for drawings and photographs in connection with the illustration of bulletins or the construction of laboratory equipment.

BUSINESS AND CLERICAL OPERATIONS.

The total appropriation for the Bureau of Chemistry for the fiscal year ending June 30, 1912, was $963,780, of which amount $107,200 was appropriated for the purpose of making investigations in regard to the application of chemistry to agriculture and for miscellaneous investigations and tests for other departments, $1,280 for investigating the character of the chemical and physical tests which are applied to American food products in foreign countries and for inspecting the same before shipment, $610,110 for the enforcement of the food and drugs act, and $242,190 for salaries.

During the year a rigid examination has been made of the business and office system of the bureau in connection with the investigation by the President's Commission on Economy and Efficiency. The preliminary work for adapting and installing in this bureau the accounting system outlined by that commission was completed, and the system made ready for operation at the beginning of the new fiscal year. A uniform system for filing correspondence and keeping records for the branch laboratories was worked out. Improved equipment for copying records and documents and for sealing envelopes has been installed with increased economy and efficiency. Machines for recording dictation have been used in certain lines of the work with good results, and it is believed that their use can be extended with advantage.

During the year 2,851 purchase orders were drawn, 5,040 vouchers were checked and passed for audit and payment, and 678 letters of authorization for travel or station expenses were issued to the members of the bureau. One hundred and forty-three thousand letters were prepared, copies of which, together with approximately 71,428 letters received from 25,065 correspondents, were indexed and filed. One hundred and twelve thousand one hundred and fifty-eight mimeograph letters were made on 795 subjects.

In the interstate and import office 6,769 guaranties under the food and drugs act were examined, approved, and serial number assigned. Complete records of all interstate cases and seizures and all import cases were kept. The records, showing the action on each case at every stage and the progress of the case from the time the sample is received until the case is transmitted to the Solicitor, are voluminous and complex, involving a vast number of details. This office also keeps the bureau records of the cases under the insecticide and fungicide act, in which this bureau cooperates with the board charged with the enforcement of that act. The clerical force of the bureau reported 6,938 hearings before the Board of Food and Drug Inspection or at the branch laboratories.

The system of purchasing chemicals and chemical supplies in large quantities and distributing them from a central storeroom to the various laboratories, both in and out of Washington, has worked for economy and efficiency in several ways. Every shipment of supplies is tested before being accepted, which results in maintaining a high and uniform standard of quality with a low cost for testing.

SPECIAL WORK PLANNED FOR THE FISCAL YEAR 1912-13.

INSPECTION WORK.

Routine inspection matters and frequent short investigations will occupy the greater portion of the time of the inspectors during the coming fiscal year, but special assignments will be given attention as the subjects for inquiry may develop. As in all forms of police work, the detection of violations is difficult to anticipate and is based largely on methodical and constant surveillance of the producing, shipping, and consuming sections of the country.

The results of the investigations of medicines furnished to physicians by supply houses justify further collection of samples of this character.

Among the more important projects outlined is the continuation of a concerted investigation at the proper season of canneries, with particular reference to the packing of canned goods with excessive quantities of water, brine, sauces, and other useless fillers.

As in the past, there will be periodical inspections made of the fresh milk furnished to cities situated near State borders which receive a large part of their supply from producers in a neighboring State. Attention will also be given to the interstate traffic in canned milks.

Sufficient is known of the insanitary condition of oyster and clam beds to warrant wholesale collections when the shellfish season opens, provided necessary steps have not been taken in the meantime by the shippers or the owners to improve the state of their properties.

Certain inspectors will be required under previous departmental instructions to collect samples in the enforcement of the insecticide and fungicide act, 1910.

FOOD INVESTIGATIONS.

The work of the division of foods and the branch laboratories will continue to consist largely of the examination of samples of interstate and imported foods and drugs in connection with the enforcement of the food and drugs act. Analytical methods will be studied and new methods devised according to the needs arising from conditions of manufacture and the character of adulterations.

Special investigations planned during the year are as follows:

New shortening materials now appearing on the market, which are made by saturating the liquid glycerids of vegetable oils, will be investigated and a method for detecting synthetic stearin in lard compounds will, if possible, be elaborated.

The work on peanuts and peanut oil will be continued and the pecan investigation will be carried through another season.

The special work on the preparation of brandies and cordials will probably be finished during the coming year. It is further planned to make a study of the preparation of malt liquors from various kinds of raw material, especially along the line of determining the absolute composition of products made from barley, and of the composition of grape juice made on a commercial scale during the coming grape season at one or two large grape-juice factories.

Experiments in the shipping of food products will be carried out to get definite information as to changes caused by temperature, altitude, and humidity.

It is planned to continue the study of the coloring and facing materials in teas, the work on the identification and separation of coal-tar dyes which are used in foods, and the detection and identification as well as the separation of vegetable colors, especially attempting to apply spectroscopic methods for identification both on the vegetable and coal-tar dyes.

An attempt will be made to bring together all of the analytical data and experimental records in connection with the study of the manufacture of cider vinegar into the form of a completed bulletin, so that this data will be available.

Branch laboratories have submitted the following subjects to be considered for special attention during the coming year: Composition of standard and commercial vanilla extracts, a method for the determination of oil of peppermint and of oil of nutmeg in alcoholic solutions, rice and sake vinegar, estimation of glycerol in wines and vinegars, natural barrel fermentation of apple cider into vinegar, coal-tar colors, determination of saponin in food products, California fruits, sanitary conditions of the oyster-canning industry, corn meal in its relation to pellagra, determination of heavy metals in foods, composition of soy-bean food products, and the salmon-canning industry.

ENOLOGICAL STUDIES.

Studies on normal and sophisticated wines from native American grapes; on changes in composition of grapes during ripening, on methods of analysis of fruits, fermented and unfermented fruit juices, and on the fermenting power of yeasts at different temperatures, will be continued, and the study of commercial wines made from the *Vitis vinifera* grapes (California wines), and the manufacture of pure samples of wine from the *Vitis vinifera* grapes for the purpose of determining normal composition will be undertaken.

FOOD RESEARCH WORK.

An extra effort will be made during the coming year to push that part of the work dealing with the transportation of perishable products, including the comparative merits of shipping poultry, hard, frozen, and chilled. It is planned, also, to continue the present lines of work on precooling eggs and dry cooling dressed poultry, carrying the demonstrations to isolated packers by means of the perambulating refrigerator. This portable refrigerating plant can be made a forceful educational factor for inculcating progressive ideas in the countryside at large, showing shippers what it means to have good handling and refrigeration.

The investigation of the handling of frozen and dried eggs will be again pursued during the egg-breaking season in the producing section, using the Omaha laboratory as the center for laboratory work, and three commercial establishments, which have been equipped to handle eggs with bacteriological cleanliness, for a source of samples and locations in which experimental work on a commercial scale can be done. When the egg-breaking season ends it is planned to follow the products frozen or dried to the bakers, working cooperatively with them to study the routine to which the egg products are subjected and their rate of deterioration after thawing or dissolving.

Many laboratory problems are contemplated which will, it is hoped, be applicable to industrial problems, even though they appear to be essentially scientific. Such, for example, is the pushing of work on the behavior of flesh enzyms in relation to the postmortem changes occurring in flesh foods, the variation in composition and flesh changes caused by blood remaining in the tissues, the behavior of various molds in relation to flesh changes, and the rapidity with which bacteria penetrate flesh.

Probably the most important plans which are being made are for the extension of the facts already obtained to the industry, that they may be utilized promptly and efficiently for the good of the people. It is comparatively easy to determine in the laboratory and by experimental observation wherein the shipper errs or the middleman fails, but it is extremely difficult to get this information to the shipper or the middleman in such wise that he will understand, believe, and apply it.

DRUG INVESTIGATIONS.

In addition to the routine analysis of drugs subject to the law, it is the intention to continue the investigations toward arriving at more satisfactory methods for the separation and determination of alkaloids in complex mixtures and the assay of crude drugs, and the analysis of fluid extracts and tinctures. As in the past, special attention will be given to the improvement of the methods of analysis of opium and complex mixtures containing varying quantities of opium. A study of the analytical methods now in use for the determination of morphin in tablets and liquid mixtures will be continued. It is the intention to investigate processes for the separation of codein in the presence of other alkaloids and to continue the investigation of the methods for the determination of nitroglycerin in nitroglycerin solutions and tablets. Attention will be given to the study of pepsin and of enzymic action in general, with a view to arriving at more satisfactory methods of assay. The study of the methods of analysis of senna, senna siftings, buchu, uva ursi, anise, fennel, coriander, cardamom, cubeb, and medicated soft drinks will be extended.

A continuation of the pharmacology of caffein and of tin, as well as biological testing and investigations of the action of digitalis, is contemplated.

MISCELLANEOUS DIVISION.

The survey of the important mineral springs of the United States, which includes a very comprehensive analysis of the water from source, will be continued as heretofore. The examination of foreign and domestic waters to determine whether or not they are properly labeled under the food and drugs act will be continued. Studies will be made of improved methods of mineral-water analysis and the radioactivity of certain mineral waters determined, the latter investigation applying especially to samples coming directly from source; of the pollution of certain waters with reference to the effects of the pollution on the condition of shellfish grown in these waters; and of irrigation and drainage waters and methods of analysis especially applicable to them.

In addition to the examination of insecticides and fungicides and the carrying out of analyses in connection with chemical problems relating thereto, as called for by other bureaus of the department, the following work and investigations will be prosecuted: (1) Analyses of insecticides and fungicides for the Insecticide and Fungicide Board in connection with the enforcement of the insecticide act of 1910; (2) orchard and laboratory tests of poisonous compounds at present used as insecticides, with the view of finding some substance which may be so used on peach and other tender foliage; (3) the supposed injury to fruit trees from the accumulation of toxic salts in the soil, due to the use of insecticides, in cooperation with the Bureau of Entomology; (4) the arsenic and copper content of fruit, vegetables, etc., to which materials containing these substances have been applied in spraying operations; (5) improved and new methods for examining insecticides and fungicides.

The examination of cattle and poultry foods entering into interstate commerce will be considered, and extensive study will be made of range forage crops, necessitating a careful comparison of all published work done along that line. There will be, as in the past, much work done for other departments and bureaus of the Government, as well as for other laboratories of the Bureau of Chemistry, to aid in solving various chemical problems involving grains and cattle foods. Chemical methods of determining the deterioration due to molds, bacteria, etc., in cattle foods and improved methods of cattle-food analysis will be continued, and investigations of cattle-food manufacturing plants will be made with the idea of determining more definitely just what substances should be present in certain cattle-food materials which enter interstate commerce.

The study of the effect of smelter wastes on animal and vegetable life will be continued as such work is requested by the Department of Justice. If time permits, the effect of other waste on vegetation and animal life will be undertaken and sanitary studies relative to poisonous substances in household articles and foods and feeds will be continued.

SUGAR INVESTIGATIONS.

A continuation of the study of maple sap and its changes when stored in containers of various metals and when concentrated in evaporators made of different metals will be carried out during the maple season. The work on sugar-cane products and sorghum sirup and the study of the sugar industry of the South will be pushed during the manufacturing season. The environment studies on the sugar content of muskmelons will be steadily advanced.

PLANT PHYSIOLOGICAL STUDIES.

The work for the coming year will continue to be along the lines of collaboration with the different offices of the Bureau of Plant Industry, including (1) investigations on the influence of environment on the composition of cereals and other plants, and (2) a study of the value of wheat for milling and baking purposes. New investigations will be undertaken as follows: (1) Methods of bread making in vogue in the principal cities of the country; (2) the study of macaroni made from different products, including the use of coloring matters; and (3) a study of the changes in the nutritive value of hay of various kinds when cured under different conditions.

LEATHER AND PAPER LABORATORY.

During the year 1912–13, besides continuing the routine testing of supplies for the various departments and serving as members of committees for the passing on these supplies or the preparation of specifications therefor, the laboratory force will conduct the following investigations: Continuation of the investigations on the production of wood turpentine and other products from the distillation of wood, with special reference to the industrial value and relation to health of wood turpentine; practical experiments on the value of various kinds of sole leather, treated in different ways, for the purpose of determining the characteristics of a suitable and durable sole leather and of devising laboratory methods for determining those qualities; experiments on the tanning of leather, primarily for the purpose of determining the proper procedure for the production of a high-grade durable leather, that the raw materials (which are now entirely inadequate for the demands of the nation) may be conserved and made to more nearly supply our national need; the study of unusual paper-making materials; methods of cooking stock and methods for the utilization and disposal of paper-making wastes; investigations looking to the improvement of the quality and quantity of rosin and methods for grading the same; testing of turpentine and rosin for adulterants under the food and drugs act; and a study of analytical and testing methods for determining the purity and use value of materials within the province of the laboratory.

CONTRACTS LABORATORY.

The work will be mainly the examination of miscellaneous material purchased by the Government. Work will be continued on paint and painting materials, and what is believed to be the most carefully worked out series of white paint exposure tests that has yet been started will be exposed on a fence constructed for the purpose on the Arlington farm. This work is in cooperation with the American Society for Testing Materials and the Bureau of Standards.

Work will be done toward drawing up a standard specification for copying ink on enamel-ware cooking utensils and on rubber and platinum laboratory utensils.

It is hoped that more standard specifications for various materials can be adopted. Many materials, such as soaps, certain pigments and oils, inks, etc., can be more advantageously bought on properly drawn up specifications than on samples, but great difficulty is encountered in inducing purchasing officers to follow this course.

The work of the laboratory should be largely investigating methods of testing rather than examination of such a large number of samples, and with a proper use of specifications it is probable that even with the present force an appreciable fraction of the time could be devoted to such work, while under the present system very little systematic work of this kind is possible.

REPORT OF THE CHIEF OF THE BUREAU OF SOILS.

U. S. Department of Agriculture,
Bureau of Soils,
Washington, D. C., November 1, 1912.

Sir: I have the honor to transmit herewith a report covering the operations of the Bureau of Soils for the fiscal year ended June 30, 1912.

Respectfully,
Milton Whitney,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

PROGRESS OF THE SOIL SURVEY.

THE YEAR'S WORK.

During the fiscal year ended June 30, 1912, soil surveys were made of 181,114 square miles, or 115,912,960 acres—an area 50 per cent larger than Great Britain and Ireland. Of this amount 31,304 square miles, or 20,034,560 acres, were surveyed in detail and maps have been or will be published on a scale of 1 mile to 1 inch. This work was distributed in 28 States. The remainder of the total area, namely, 149,810 square miles, or 95,878,400 acres, was mapped on reconnoissance scales of 4 or 6 miles to 1 inch. These maps show only the more general facts regarding the classification and distribution of soil material. The reconnoissance surveys have been principally confined to the semiarid region and have covered the western half of the States of North and South Dakota, Nebraska, Kansas, the Panhandle of Texas, and a large area in south Texas, making almost a continuous strip from Canada to Mexico.

The total area of soil surveyed and mapped in the United States from the beginning of the work to June 30, 1912, deducting for the few overlapping areas between the general reconnoissance and the detailed surveys, is 622,595 square miles, or 398,460,800 acres. Deducting the sparsely settled Rocky Mountain region, the Northwest intermountain region, the Great Basin region, and the arid Southwest, where about 1 per cent of the soils have been surveyed, 29.2 per cent of the soils of the country have been classified and mapped.

The report of the Field Operations for the calendar year 1910 is about ready to be issued by the Public Printer, and the reports and maps of all the field work in the calendar year 1911 are prepared and ready for the printer, several of them having already been published as advance sheets.

At the time of writing this report the total area of soils surveyed in the United States is about equal to the combined areas of Germany, France, Great Britain and Ireland, and Italy, as appears from the following table:

Area of several European countries.

	Sq. miles.
Germany	208,780
France	207,054
Great Britain and Ireland	121,391
Italy	110,659
Total area	647,884
Area covered by soil surveys to June 30, 1912	622,595

The following tables show the areas surveyed during the last fiscal year and the total area surveyed in each State up to the present time:

Individual areas surveyed and mapped during the fiscal year ended June 30, 1912.

DETAILED.

State or Territory.	Area.	Area surveyed.	
		Square miles.	Acres.
Alabama	Chilton County	722	462,080
	Clarke County	[1] 490	313,600
	Conecuh County	218	139,520
	Covington County	505	323,200
	Elmore County	656	419,840
	Madison County	800	512,000
	Marshall County	610	390,400
Arkansas	Ashley County	600	384,000
California	Fresno area	[1] 367	234,880
Connecticut	Windham County	[1] 12	7,680
Florida	Ocala area	1,040	665,600
Georgia	Ben Hill County	250	160,000
	Chattooga County	170	108,800
	Dougherty County	339	216,960
	Troup County	434	277,760
Indiana	Boone County	225	144,000
	Montgomery County	145	92,800
	Tipton County	155	99,200
Kansas	Cherokee County	120	76,800
	Greenwood County	265	169,600
	Jewell County	225	144,000
	Reno County	[1] 1,170	748,800
	Shawnee County	540	345,600
Kentucky	Christian County	175	112,000
Louisiana	East Feliciana Parish	454	290,560
Massachusetts	Plymouth County	[1] 356	227,840
Minnesota	Goodhue County	195	124,800
Mississippi	Lincoln County	586	375,040
	Warren County	575	368,000
	Wayne County	[1] 499	319,360
	Winston County	577	369,280
Missouri	Audrain County	682	436,480
	Carroll County	270	172,800
	Cass County	297	190,080
	Franklin County	908	581,120
	Laclede County	735	470,400
	Macon County	[1] 556	355,840
	Miller County	142	90,880
	Pike County	100	64,000
	Platte County	[1] 117	74,880
	Stoddard County	425	272,000
	Sullivan County	641	410,240
Nebraska	Otoe County	215	137,600

[1] Does not include portions of this area surveyed in preceding years.

Individual areas surveyed and mapped, etc.—Continued.

DETAILED—Continued.

State or Territory.	Area.	Area surveyed.	
		Square miles.	Acres.
New Jersey	Sussex area	[1] 88	56,320
New Mexico	Mesilla Valley area	192	122,880
	Middle Rio Grande Valley area	275	176,000
New York	Jefferson County	[1] 1,111	711,040
	Orange County	170	108,800
North Carolina	Johnston County	[1] 540	345,600
	Pender County	853	545,920
	Randolph County	535	342,400
North Dakota	Barnes County	135	86,400
Ohio	Stark County	220	140,800
Oregon	Hood River Valley area	114	72,960
	Medford area	[1] 282	180,480
Pennsylvania	Bedford County	[1] 477	305,280
	Bradford County	[1] 471	301,440
South Carolina	Barnwell County	870	556,800
	Chester County	592	378,880
Tennessee	Robertson County	155	99,200
Texas	Archer County	960	614,400
	Harrison County	[1] 535	342,400
West Virginia	Huntington area	1,255	803,200
	Morgantown area	[1] 658	421,120
	Preston County	315	201,600
Wisconsin	Buffalo County	202	129,280
	Columbia County	785	502,400
	Dane County	155	99,200
	Jefferson County	140	89,600
	Juneau County	[1] 465	297,600
	Kewaunee County	[1] 191	122,240
Total		31,304	20,034,560

RECONNOISSANCE.

State or Territory.	Area.	Square miles.	Acres.
Arkansas-Missouri	Ozark Region	58,000	37,120,000
Nebraska	Western area	53,064	33,960,900
Ohio	State	8,660	5,542,420
Pennsylvania	Northeastern area	[1] 5,768	3,691,500
	Southeastern area	1,700	1,088,020
Texas	South-central area	18,088	11,576,300
Washington	Quincy area	[1] 43	27,520
	Southwestern area	4,136	2,647,040
Wisconsin	Northeastern area	351	224,640
Total		149,810	95,878,400

[1] Does not include portions of this area surveyed in preceding years.

Total areas surveyed and mapped in the several States during the fiscal year ended June 30, 1912, and the areas previously reported.

DETAILED.

State or Territory.	Work during 1912.	Work previously reported.	Total.	
	Sq. miles.	*Sq. miles.*	*Sq. miles.*	*Acres.*
Alabama	4,001	25,939	29,940	19,161,600
Arizona		611	611	391,040
Arkansas	600	2,677	3,277	2,097,280
California	367	12,564	12,931	8,275,840
Colorado		2,809	2,809	1,797,760
Connecticut	12	1,033	1,045	668,800
Delaware		314	314	200,960
Florida	1,040	3,723	4,763	3,048,320
Georgia	1,193	7,866	9,059	5,797,760
Idaho		1,281	1,281	819,840
Illinois		5,925	5,925	3,792,000
Indiana	525	4,204	4,729	3,026,560

Total areas surveyed and mapped, etc.—Continued.

DETAILED—Continued.

State or Territory.	Work during 1912.	Work previously reported.	Total.	
	Sq. miles.	*Sq. miles.*	*Sq. miles.*	*Acres.*
Iowa		2,303	2,303	1,473,920
Kansas	2,320	3,275	5,595	3,580,800
Kentucky	175	2,344	2,519	1,612,160
Louisiana	454	8,756	9,210	5,894,400
Maine		939	939	600,960
Maryland		4,060	4,060	2,598,400
Massachusetts	356	1,138	1,494	956,160
Michigan		4,360	4,360	2,790,400
Minnesota	195	2,713	2,908	1,861,120
Mississippi	2,237	10,969	13,206	8,451,840
Missouri	4,873	10,176	15,049	9,631,360
Montana		432	432	276,480
Nebraska	215	3,116	3,331	2,131,840
Nevada		235	235	150,400
New Hampshire		1,411	1,411	903,040
New Jersey	88	2,076	2,164	1,384,960
New Mexico	467	129	596	381,440
New York	1,281	8,943	10,224	6,543,360
North Carolina	1,928	13,358	15,286	9,783,040
North Dakota	135	6,031	6,166	3,946,240
Ohio	220	4,580	4,800	3,072,000
Oklahoma		1,160	1,160	742,400
Oregon	396	1,457	1,853	1,185,920
Pennsylvania	948	8,845	9,793	6,267,520
Porto Rico		330	330	211,200
Rhode Island		1,085	1,085	694,400
South Carolina	1,462	10,313	11,775	7,536,000
South Dakota		675	675	432,000
Tennessee	155	6,137	6,292	4,026,880
Texas	1,495	16,511	18,006	11,523,840
Utah		1,501	1,501	960,640
Vermont		227	227	145,280
Virginia		6,437	6,437	4,119,680
Washington		1,652	1,652	1,057,280
West Virginia	2,228	5,929	8,157	5,220,480
Wisconsin	1,938	6,514	8,452	5,409,280
Wyoming		309	309	197,760
Total	31,304	229,372	260,676	166,832,640

RECONNOISSANCE.

State or Territory.	Work during 1912.	Work previously reported.	Total.	
Arkansas-Missouri	58,000		58,000	37,120,000
Kansas		39,960	39,960	25,574,400
Nebraska	53,064		53,064	33,960,960
North Dakota		39,240	39,240	25,113,600
Ohio	8,660		8,660	5,542,400
Pennsylvania	7,468	25,383	32,851	21,024,640
South Dakota		41,400	41,400	26,496,000
Texas	18,088	69,297	87,385	55,926,400
Washington	4,179	8,936	13,115	8,393,600
Wisconsin	351	1,396	1,747	1,118,080
Total	149,810	225,612	375,422	240,270,080

COOPERATION.

Cooperation between the Bureau of Soils and the State experiment stations or other State institutions in doing soil-survey work has been extended during the fiscal year. It has not been discontinued except temporarily in any State during the year, while it has been inaugurated in additional States. The bureau is now cooperating with some of the institutions in the following States: Alabama, Florida, Georgia, Indiana, Kansas, Missouri, Nebraska, New York, New Jersey, North Carolina, North Dakota, Ohio, Pennsylvania, Tennessee, Washington, West Virginia, and Wisconsin. The cooperative work with the State of Washington was temporarily discontinued for the spring and summer of 1912, but will probably be resumed again in the spring of 1913. Cooperative work was inaugurated in 1912 in Florida, Georgia, Indiana, Nebraska, North Dakota, and Ohio. Arrangements are already being made to cooperate with Iowa and Minnesota in 1913.

The demands made on the bureau for soil-survey men to carry on this cooperative work with the States have been so great that it has been practically impossible, with the appropriations at the disposal of the bureau, to do any work in the Northern States except in those cooperating, and in these only in such areas as the State and bureau officials may mutually agree upon. In the Gulf States, where the entire force is massed during the winter months, less than half the men are engaged in cooperative work. So many projects have been demanded by the cooperating States that the bureau has been able to assign but one man to each project. This man is usually, however, the head of the soil-survey party in that area, his assistant being a State man. The bureau has been able to undertake but two projects in noncooperating States out of a total of about 40 carried on in the Northern States during the latter part of the fiscal year. As the demands increase its whole force will be engaged in this work, unless the resources of the bureau are increased.

At the present time most of the cooperating States are prepared to undertake more projects than those now in operation, but the bureau has not been able to meet the States in this matter on account of limited resources.

SOILS OF THE UNITED STATES.

Detailed soil-survey work has been carried on in all parts of the United States. It is probable that all the widely distributed and important soils in the country have been encountered and identified in one or more places. It is impossible that any very important soil has escaped attention. A knowledge of the distribution, character, and adaptabilities of these soils has accumulated to such an extent that the bureau is able now to issue comprehensive reports on the soil conditions in the country as a whole, as well as reports on the important soils of the country under their various manifestations and uses. Two years ago the first one of these reports was issued as Bulletin 78 of the Bureau of Soils, in which the nature and adaptabilities of the soils east of the Great Plains were described. During the past year the compiling of the second was begun and had been brought well toward completion at the close of the fiscal year. It includes a revision, in the light of recent data, of the work of two years ago and for the first time a complete classification and description of the soils of the western part of the United States so far as they have been encountered in the soil survey. The complete report will contain, therefore, a description of the soils of the whole country and a consideration of their present and prospective uses. Revised editions of this report will be issued from time to time as the accumulated data warrant.

SOIL CLASSIFICATION.

On account of the broad scope of the soil-survey work, the area it covers, and the many soils encountered, the proper grouping and classification of the soils becomes increasingly important and increasingly complex. The whole subject is a new one. No organization, except the Bureau of Soils, has ever undertaken to classify, in detail, the soils of any country, however small or however simple. There are no traditions, therefore, to guide the bureau in this work. It is breaking new ground. It is inevitable, therefore, that mistakes have been and will continue to be made. In order to correct the past ones and avoid the future ones, an increasing amount of attention has to be paid to this part of the work. During the last year more time has been spent in this work than in any previous year. More attention has been paid to inspection, also, making this important branch of the work somewhat more expensive.

RECONNOISSANCE SOIL SURVEYS IN STATES.

Heretofore the reconnoissance soil-survey work of the bureau has been carried on exclusively in the Great Plains region, except the work in the State of Pennsylvania and in the western part of the State of Washington. There is an increasing demand, however, for reconnoissance soil-survey work in the States. It comes mainly from the officials of the agricultural experiment stations. The increasing demand made on these officials for experimental work makes some knowledge of the soils of their States increasingly important. On account of the necessarily slow rate of progress in the detailed work of the bureau, the experiment station officials are willing to accept, for the time being, the general knowledge furnished by a reconnoissance survey. This knowledge will give them a basis for work pending the completion of the detailed survey of their States. It seems probable that this demand will increase and that it will be necessary for the bureau to expend a considerable part of its appropriation in this work in the near future. None of the States desires, however, to discontinue or decrease the rate of the detailed work. The demand for reconnoissance work is a demand for additional work to meet temporarily urgent and pressing needs.

SOIL SURVEYS OF THE NATIONAL FORESTS.

In the latter part of the fiscal year 1912 Congress passed a law providing for the classification of the lands included within the national forests. This work will involve several factors, an important one being the soil. As soon as the bill became a law the Forester asked for the cooperation of the Bureau of Soils in this work. With the limited resources of the bureau, only four men could be detailed to this work for the present. These men will begin work before the close of the field season of the summer of 1912. The importance of this work will demand additional men and additional resources in the summer of 1913. It will require the most experienced men on the bureau's staff, men of great skill and of mature and sound judgment, and I have submitted a separate estimate to cover the salaries of such men as it is thought will be needed, the Forest Service to pay their field expenses, and the money saved by their transfer to the new field to be used to secure additional men for the soil survey.

EDUCATIONAL SETS OF SOIL SAMPLES.

Several years ago the Bureau of Soils put together a set of soil samples, including the most important soils that had been identified up to that time. Sets were distributed to the agricultural colleges for use in instruction. The demand for such educational material was large and the bureau soon found itself unable to supply the demand without the expenditure of more money than was then thought advisable. Since that time the survey's work has identified a much greater number of very important soils, and, as was stated above, has probably identified all the very important soils in the country. On account of this and of the demand by educational institutions for samples, a demand that has never ceased, it is now proposed to prepare sets of about 50 samples of soil and a corresponding number of subsoils, including and illustrating the soils of great national importance, to be distributed to agricultural colleges and schools where agriculture is taught, so that students can see as they study actual samples of soils used by thousands and thousands of acres for truck, corn, wheat, fruit, tobacco, and other special and general farm crops. To accomplish the end sought will require the assignment of one man to this work and the allotment of sufficient money to enable him to work effectively, which would amount, all told, for salary and expenses, to about $5,000 per year.

USE OF SOILS.

During the year there has been prepared a set of circulars giving a brief and nontechnical description of the origin, place of occurrence, properties, and uses of 40 of the most important types of soils found within the eastern portion of the United States. Each of these circulars gives a full description of the individual soil type, its present and prospective agricultural uses, the common methods of soil management and treatment, and the chief requirements to increase the producing capacity of the soil to render its use more economically profitable to the individual farmer and to the country at large. The present extent of occupation of the type and the possibilities for the more extended use of each soil are also estimated. These circulars are available for use in answering general or specific questions regarding each soil.

A corresponding set of bulletins is in course of preparation, which will discuss at greater length the essential facts which have been learned through the extended study by this bureau of each of the most important soil groups or series of the Eastern States. Each bulletin will constitute a monograph upon the origin, mode of formation, region of distribution, agricultural occupation, best uses for general and special crops, and the results now obtained from the various members of each soil series. It will also discuss the fundamental scientific reasons which are found to underlie the variations in crop adaptation to soils because of differences in the original sources of the soil-forming materials, their mode of deposition, their differences in essential inherent properties, and the differences which arise from attendant differences in utilization and soil management.

Both of these classes of publications are intended to summarize the vast amount of useful information which has been secured in the progress of the soil survey and to render it easily accessible to farmers, teachers, investigators of soil problems, students of agricultural economics, and investors in farm lands. They will ultimately serve to present the first classified and detailed description of the available soil resources of the Nation.

SOIL CHEMISTRY.

Work has continued in determining the composition of important soil types. The very large number of minerals found in rocks has been found to be present in most soils, and the natural productivity of a soil has been shown to be associated with mineral heterogeneity. Careful chemical analyses have shown that practically all of the mineral elements are usually present in a soil and that some of these elements probably have an importance in plant production and soil management not hitherto suspected.

Sulphur is important for the growth of many species of plants, if not of all. The quantity naturally present in most soils is quite low, and that it may have an importance in fertilizer practice hitherto not appreciated seems quite probable. Vanadium is found in most soils in amounts comparable with phosphorus. Manganese, important in effecting oxidation processes in soils, has been found to be concentrated in surface soils. Silica has been shown to be higher in the surface soil than in the subsoil, while iron, aluminum, and titanium are uniformly higher in the subsoil. Lithium is present in all soils. Rubidium and cæsium have not been found. The rare earths are present in all cases, as are chromium, vanadium, zirconium, barium, and strontium, in decided amounts. Radio-activity has been shown not to be characteristic of either soil or subsoil particularly, but rather it is associated with sulphates of barium, strontium, and possibly other mineral salts. It has been shown that while certain fertilizers which have recently come into the American market, such as ground feldspar, ground phonolite, ground lava, etc., may occasionally produce a favorable result, there is no scientific basis for believing that they would generally produce any special or lasting improvement in the soil, and they can not be expected to replace the standard mixtures of mineral salts commonly found in high-grade commercial fertilizers.

Work has been continued in the investigation of the properties of the soil solution and the alteration and decomposition of soil minerals.

FERTILIZER INVESTIGATIONS.

The fertilizer investigations have shown that the United States contains ample raw materials for the production of all the standard fertilizer materials that it now demands. The giant kelp groves on the Pacific coast from the Mexican border to Cape Flattery have been mapped and work is in progress, from which it will soon be possible to estimate the value of this great resource. It is known now hat it can produce several times the present needs of the country in potash salts. The investigations of the desert basins of the United States have been continued and the several basins of commercial promise have been delimited. Potash salts of commercial value are now known to exist in one—Searles Lake—and this bureau, the

United States Geological Survey, and private interests are rapidly exploring the other promising areas. Numerous locations of nitrate have been examined, but none of present commercial importance has been found. A very comprehensive examination of American rock-salt deposits and salt wells has been made, showing the universal presence of potash salts, but it has also been determined that there is little prospect of utilizing this source of potash under present commercial conditions. The value of alunite itself and potash salts from it has been shown. An examination of all methods yet suggested for extracting potash from silicates has been and is yet in progress, and the conditions under which such a process may have a commercial importance demonstrated. No method has yet been proven commercially practicable, but recent work not yet completed makes it seem probable that practically unlimited supplies of potash from feldspar and similar minerals may soon be attainable.

Examination of American phosphate fields has continued, and every known field has now been studied on the ground as well as in the laboratory. None of the fields hitherto worked, contrary to popular impression, is exhausted, though some of them are not now being worked profitably. The present fields, together with the unworked areas, are known to contain enough high-grade material to supply three times the present needs of the country for more than a thousand years. The utilization of low-grade rock with the acid and basic slags of American furnaces has been studied. Likewise valuable investigations have been made of the manufacture of phosphate, sulphuric acid, fish scrap, city wastes, oven by-products, and other methods of utilizing raw products for the production of fertilizers.

SOIL PHYSICS.

During the last year a study has been made of the mechanical operations of tillage as they are affected by the physical characteristics of soils and especially by the moisture content and water-holding capacity of soils. Investigations have been initiated on the mechanical movement of soils and the interchanges between soil and subsoil under alternate wetting and drying of the soil. It has been shown that the resultant of all the natural forces tends continually to make a soil lighter and lighter in texture, unless corrected by cultural methods. Much work has been done in improving methods for the mechanical analysis of soils and in designing apparatus for the extraction of potash from silicate rocks, instruments for studying the radioactivity of soils, etc.

SOIL-FERTILITY INVESTIGATIONS.

The results obtained in the last year through laboratory investigations in soil fertility have been the most important in recent years. The nature and properties of the constituents of organic matter in the soil as affecting the fertility and infertility of soils has been fully established and some illuminating facts in regard to soil fertility ascertained. The nature of the organic matter which composes the soil humus has received the same attention which has been accorded it in these laboratories for some years past, and the number of definite constituents given in earlier reports has been very greatly increased by the isolation and identification of some 20 additional compounds, making a total of over 35 organic soil constitutents identified to this time. There are now representatives of nearly every important chemical class among these compounds—hydrocarbons, acids, bases, alcohols, esters, aldehydes, fats, waxes, resins, etc.—some containing nitrogen, phosphorus, and sulphur in organic combinations. The interrelationship between the compounds throws light upon the biochemical transformations which take place in soils under the influence of the microorganisms of the soil, the various classes of bacteria, molds, protozoa, etc., as well as of the enzyms from these and the influence of the roots of the higher plants. The discovery and identification of these soil constituents have already brought order out of the chaos that existed in regard to humus formation and transformation in soils under different conditions. The results have been made possible by the installation of an equipment that has permitted the handling of tons of soil in the course of these investigations.

The most noteworthy discovery in connection with the effect of these soil compounds on plants has been the fact that of the nitrogenous constituents there are many that can serve directly as plant nutrients without first undergoing further decomposition into ammonia, nitrites, or nitrates as commonly accepted. Such nitrogenous soil constituents as the decomposition products of the complex protein and nucleo-protein molecules of plant and animal substance are shown by these researches to be able to replace nitrates in plant growth, and when present in soils or nutrient solutions are absorbed by plants, with an increase in plant development, the nitrates when also present being consumed by the plant in much smaller quantity than when the organic nitrogenous soil constituents are absent. These nitrogenous compounds are present in soils in quantities approximating the nitrate content in normal soils, and this discovery of their function in soils throws much light upon the relations between nitrification and soil fertility and gives a new conception of the problem of the nourishment of plants by soils.

Certain of the biochemical factors in soils have also received detailed consideration during the last year, especially soil oxidation and soil catalysis. These two properties of soils have been quantitatively measured and their relations to each other and to other soil factors studied. It has been found that both of these factors are most strongly developed in virile soils and are weak in or absent from poor soils. They are influenced by fertilizer treatment, especially by the addition of soil ameliorators, such as lime, manganese salts, etc.

The origin of some of the organic soil constituents has received much attention. Their chemical relationships throw much light upon the class of compounds from which they are derived, but the agencies which effect these transformations are not yet clearly definite. Attention has therefore been given to the question of origin of these substances from plant débris, from plant roots by excretion, and from microorganisms, especially molds. It has become quite clear as the result of these researches that plant roots contribute some of these compounds to the soil or water in which they grow, and also that molds contribute such substances both as the result of their own life processes and after the death of the cells.

A study of the effect of heat on soil organic matter, such as it would undergo in the process of sterilization by steam, a subject which has been considered in the past almost wholly from the biological viewpoint, has led to some highly interesting results. It has been shown that during the process of sterilization some very deep-seated alterations are produced in the organic matter of the soil, as was shown by the actual isolation of the constituents before and after heating, thus presenting in the heated soil, as it were, an entirely different culture medium for bacteria and other microorganisms which would subsequently develop. Such heated soils, moreover, in spite of the fact that more nutrients are made available, in past researches have often been shown to be harmful in their first effects toward higher plants. In the soils under study by the bureau the same phenomenon was noticed and the cause traced to the production in the heated soil of a compound inimical to plant development. The compound generated by the heat was isolated and identified as the poisonous dihydroxystearic acid previously reported from this laboratory as a constituent in many infertile soils.

Besides the work of identifying the chemical units already mentioned, a further investigation has dealt with the nature of the black organic particles in soils. This investigation disclosed the fact that nearly all soils contain black particles from the size of a pea to the smallest subdivisions of soil material, which consist of highly carbonaceous matter, some of which was identified as coal, charcoal, lignite, and intermediate material, which in appearance and properties suggests such substances as pitchcoal, albertite, wurtzilite, etc.

As the result of these researches the viewpoint of agricultural investigators is undergoing a decided change from the old established viewpoint of the purely mineral requirement theory. The greatest value, however, of these researches to agriculture lies in their application to specific soil problems, such as soil exhaustion by continuous cropping and difficulties in orchards or with other specific crops, as well as to the naturally unproductive soil types. Several unproductive soils and specific problems have already been studied, the causes of unproductivity determined, and remedies devised.

The importance of these investigations can not be overestimated. They are showing us that soils are suborganic entities, with functional activities somewhat analogous to those of animals; that soils digest organic material as do animals; and that according as the material breaks down into simpler bodies along one line, with certain by-products, the functional activities of the soil are suitable for the normal growth of certain plants, or in other lines, with other by-products, they are abnormal and unsuited to the functional requirements of the plant, and, furthermore, that these functional activities of any soil may be controlled by methods of tillage, rotation of crops, and fertilizers.

SOIL-WATER INVESTIGATIONS.

The investigations of the subsoil water supply have been continued and the well census, begun the previous year, completed. A publication incorporating the results of the investigation has been prepared and is in course of publication. The outcome of the work is the accumulation of well data that indicate the level of subsoil water in every State and in 90 per cent of the counties of the mainland United States.

The water supply is the limiting factor in the productiveness of the soil and failure or shortage of the supply must result in curtailed yields of crops. In the humid regions the seasonal rainfall is depended upon for the water supply, but it is important that this should be supplemented by the storage water held in the subterranean reservoir.

In arid and semiarid regions the subsoil water is possibly of greater importance. The results of the well census have brought out several generalizations that emphasize the importance of further study in this direction.

From the data collected it appears that the subsoil water level has settled since the settlement and cultivation of the land and the impression is general that the level is continuing to change at a rate varying from region to region and ranging from a slight rise in irrigated districts to a lowering of about 3.5 feet per decade in other localities. The lowering was more rapid within the first generation of settlement than later.

The depth of water level below the surface varies considerably and, in over 60 per cent of the wells and in most States on the average of all wells, is within what is generally regarded as capillary reach of the surface.

The subsoil water is the store assuring against drought, and these data indicate that the upper level of ground water is in general not far from the limit of its availability for plant growth.

From the information gathered it appears that the actual loss of water is 10 per cent of the aggregate volume within the first hundred feet of the surface—a national loss comparable with or exceeding the destruction of forest or the waste of fuel supplies. In the light of the relation of soil water to productivity, determination of the rate of lowering of the water level and means for its prevention is of the highest importance.

Aside from the generalizations the inquiry has produced useful data pertaining to domestic water supply and to the peculiarities of wells and springs.

The investigation is pioneer work in a field of great importance and will be followed up by carefully kept records of wells in different localities. Unfortunately, owing to the illness and death of Dr. W J McGee, who was in charge of the work, there has been a temporary interruption in the investigation.

REPORT OF THE ENTOMOLOGIST.

U. S. Department of Agriculture,
Bureau of Entomology,
Washington, D. C., July 1, 1912.

Sir: I submit herewith an executive report covering the work of the Bureau of Entomology for the fiscal year ending June 30, 1912, dividing it, in accordance with your instructions, under the following heads:

(1) A summary of the important work carried on during the fiscal year ending June 30, 1912.

(2) An outline of plans proposed for work during the fiscal year ending June 30, 1913, under appropriations already made for that year.

(3) Plans of work recommended for the fiscal year ending June 30, 1914.

Respectfully,
L. O. Howard,
Entomologist and Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

WORK OF THE YEAR.

There has been no change in the classification of the work carried on under the bureau; it remains the same as that submitted in the last report of the bureau, as follows:

(1) Work on the gipsy moth and the brown-tail moth.
(2) Importations of useful insects.
(3) Exportation of useful insects.
(4) Work on insects injurious to southern field crops.
(5) Investigations of insects damaging forests.
(6) Investigations of insects damaging deciduous fruit trees.
(7) Cereal and forage-plant insect investigations.
(8) Work on insects affecting vegetable crops.
(9) Work on insects affecting citrus fruits.
(10) Investigations of insects in their direct relation to the health of man and domestic animals.
(11) Work on insects injurious to stored products.
(12) Inspection work.
(13) Work in bee culture.
(14) Unclassified work.

WORK AGAINST THE GIPSY MOTH AND THE BROWN-TAIL MOTH.

It was pointed out in the last report that a most important series of experiments had been begun with regard to the relative resistance of native trees to the attack of the gipsy moth. This work has been continued. It was shown that although the listed food plants for the gipsy moth included almost all of our native plants, it is beginning to be found out that certain species are resistant and even immune to the young larvæ. Experiments were detailed whereby, after the removal of favored food plants, a 17-acre tract of chestnut was perfectly protected, and in the same way that in another experimental tract of coniferous trees the removal of the favored food plants, particularly scrub oak and birch, left the valuable forest unattacked and practically immune. The basic idea of this work and that which has been subsequently carried on, and which must continue for some time, is to develop a system of forest management which will obviate the forest stripping which is now going on in the mixed forests of parts of New England and to protect in a large measure by this very system the stand of the trees.

Over 250 localities have been selected in different parts of Maine, New Hampshire, and Massachusetts, where different conditions of infestation exist. These places are being carefully examined from time to time in order to determine the increase of the species under varying conditions and to secure a more thorough knowledge of the feeding habits of the caterpillars. In the laboratory 50 different kinds of trees and shrubs native to New England are being used in feeding tests, and a number of other tests are being carried on to determine the behavior and development of the caterpillars when the woodland is thinned to clean stands of different species of trees. It will be necessary for the outdoor experiments to be continued for several years in order to obtain exact data, but it is already perfectly plain that the information gained in this way will have a direct bearing on the proper methods of thinning woodland in order to prevent serious gipsy-moth devastation, while it will also guide in forest planting; and, moreover, data which are gained in these experiments will determine the rate of reproduction under normal conditions for comparison with the rates in places where parasites have been liberated in the fields.

The actual work of the bureau in preventing the spread of the gipsy moth and the brown-tail moth has been carried on in the same way as in previous years. The apparent increase in the area infested by the gipsy moth has been less than in any years since 1905. The newly infested area in Maine is greater than that in all of the other States together. The spread there is attributed principally to the carrying of the very small caterpillars by the wind. With the exception of three towns in western Massachusetts (Lenox, Stockbridge, and Great Barrington), all of the new colonies which have been found are in towns contiguous to the previously known infested area. In Rhode Island the spread has been mainly toward the south, along both sides of Narragansett Bay.

While the efforts of the bureau have been directed almost entirely against the gipsy moth, the brown-tail moth has not been ignored; but as its spread by flight seems to be inevitable, concentration upon the gipsy moth seems desirable.

The authorities in all of the infested States are cooperating with the bureau in the same way as pointed out in previous reports.

The work which has been done has consisted in cleaning up the land along the roadsides, by the removal of underbrush, and, so far as possible, the favorite food trees, creosoting of gipsy-moth egg-clusters, and spraying at the proper time of the year. This work has gone so far, although there is still some roadside work to be done through the woodlands, that it seems the time will soon come when more time can be devoted toward other methods of spread than by carriage of caterpillars dropping from trees upon vehicles passing over the main-traveled roads leading through the most densely infested territory.

The inspection of shipments of various forest products from the infested area to points beyond has been continued, since this is one of the important methods of preventing the spread for long distances. Nurseries in the infested districts are inspected for the most part by the States, but where the State service is not sufficient, employees of the bureau are detailed for this purpose. Thus, during the autumn of 1911 and the spring of 1912 several men were loaned to the Massachusetts nursery inspector for this work, and during the past winter a cleaning up of the woodland around the borders of the more important nurseries has been completed. The underbrush, poor trees, and, so far as possible, favorite food trees have been removed, to prevent the breeding of the moths and to lessen the danger of the nursery stock becoming infested from the surroundings. The trees left growing in these areas are treated with sticky bands, and are being watched carefully during the summer of 1912, and all larvæ are being destroyed. Applications have been made for shipments of forest products of different kinds, and from material examined egg-clusters and larvæ of the gipsy moth have been removed. Further in this general direction, during July, 1911, when the brown-tail moths were flying, agents of the bureau were detailed to examine at stations on the border of the infested area railway trains running from the badly infested territory. As the moths are attracted to light, it seems quite probable that enough moths may fly into passenger trains, where they may ride for long distances, to establish new and important colonies beyond the infested border. During the flight season in this way 887 adult brown-tail moths were taken from trains.

Some experiments with new spraying compounds, with material for sticky bands, and with preparations to use in the place of creosote for treating egg clusters of the gipsy moth have been tried, but none of them has been shown to be better than the material already in use.

During and immediately following the hatching period of the gipsy moth in 1912 unusually high south and southeast winds prevailed, from which there has probably been considerable spread of the small larvæ.

The gipsy-moth situation as a whole seems to be better than in the past two or three years. Less woodland is being defoliated and the public is not so much disturbed. The brown-tail moth does not seem to be so serious a pest over a large part of the territory infested as it was two years ago. There are yet many places where it has caused serious damage and discomfort to the people, especially, perhaps, in the summer resorts in New Hampshire, but fewer complaints are heard of brown-tail rash, and the public press now hardly mentions it.

FIELD WORK BY STATES.

The 1911–12 work in Massachusetts has been the continuance of cleaning along woodland roadsides and their care through the caterpillar season by banding with sticky material and spraying with arsenate of lead. This is the same work that has been in progress for nearly six years. The principal routes of travel have been nearly all covered, and less of this work will be needed during the coming season. It is proposed now to give more attention to an attempt to exterminate the gipsy moth along the western border of the infested region. This work has already been begun, and towns on the border have been examined by scouts during the present year and the infested localities have been cleaned up and put in shape for attention during the season. Fifteen to twenty men were kept in the extreme western part of the State most of the winter to examine carefully the Berkshire region for the gipsy moth, which had been discovered there in the towns of Lenox and Stockbridge in August by men in the employ of the forestry contractor. Most of the work in these two towns has been done by State and town employees. Scouts in the employ of the bureau found the gipsy moth in Great Barrington, which adjoins Stockbridge on the south, in November, 1911. An extensive colony of brown-tail moths was found in North Adams, and this was gone over by employees of the bureau and all winter webs which could be found (approximately 13,000) were destroyed. Both gipsy moth and brown-tail moth have been found, during the past season, close to the New York border.

In New Hampshire scouting work and creosoting egg-masses was carried on in the early winter, but, owing to deep snow and unusual cold, it was abandoned in January and could not be resumed until April. The outer edge of the infested territory has been carefully worked over, as in previous years. A few towns in the northern and western border, formerly infested with the gipsy moth, have been apparently cleared; none of these insects has been found for two years past.

In Maine the severity of the winter interfered seriously with work, just as it did in New Hampshire. In January men were transferred from this State to Rhode Island and returned in April. The area infested by the gipsy moth in this State seems to have increased considerably during the past year, although not quite so much as in the preceding year. Most of the spread is attributed to the wind, the minute caterpillars floating in from badly infested areas south and west. No large forest areas have been defoliated, and, while the gipsy moth occurs over large areas, little real damage is being done by it. The brown-tail moth situation, however, is perhaps more serious in Maine than in any other State.

In Rhode Island some ground was lost; there was no State appropriation for work in 1911, and no summer work was done. More than 100 employees of the bureau began work in this State in January and finished in April. About two-thirds of the State was scouted and approximately 38,000 egg-clusters were creosoted. Five new towns were found infested. Money has been appropriated by the State for 1912, and it is hoped that the ground lost will be regained. The brown-tail moth has spread slightly in this State and the northeastern part is badly infested in spots.

In Connecticut the gipsy-moth situation is most encouraging. The State authorities have been very energetic and have done most of the work. No trace of the moth has been found at Stonington, where a bad colony existed some years ago. At Wallingford, where two years ago 5,000 egg-masses were creosoted, two of the most expert scouts of the bureau in December, 1911, and January, 1912, were able to find only 5 egg-clusters.

IMPORTATIONS OF USEFUL INSECTS.

IMPORTATIONS OF INSECT ENEMIES OF THE GIPSY MOTH AND THE BROWN-TAIL MOTH.

During the fiscal year under consideration the gradual change instituted the previous year in the work of importing insect enemies of the gipsy moth and the brown-tail moth by reducing the number of importations, paying more attention to the study of the intimate relations of certain of the parasites in their native homes, and especially making an effort to study and import species heretofore considered as not especially prominent but which may fill in important gaps in the parasite chain, and further, devoting more attention to the study of the American conditions and rate of spread of parasites previously imported, has been followed up. An important step was taken on December 1, 1911, whereby the work of introducing and colonizing parasites and predatory enemies of the gipsy moth and the brown-tail moth, which had hitherto been carried on cooperatively with the State of Massachusetts, was transferred bodily to the bureau. The arrangement went into effect on that date. At this point it should be stated that the cooperation on this project between the State of Massachusetts and the United States Department of Agriculture, which has been in effect for about 6 years, has been thoroughly satisfactory. Without the assistance of the State the operations could not have been carried on upon so large a scale as has been possible. The most cordial relations have existed and the most perfect facilities have been offered to the experts of the bureau at the expense of the State. The growing importance of the work and the urgent need for the diversion of all possible State funds to other aspects of the investigation have brought about the transfer indicated. The Massachusetts end of the work has been carried on in much the same way as heretofore, a number of State employees having been transferred to the bureau rolls, so that their previous training and experience was available.

During the first half of the fiscal year only a small amount of parasitic material was received from Europe, but although the quantity was small the quality was excellent. Most of this material was wintered at the laboratory, and during the spring of 1912 there has been a good emergence of parasites and several vigorous colonies have been liberated in the field. Especial mention was made in the last annual report of the receipt and liberation of 23,000 specimens of *Apanteles solitarius*, a species which seems to be important in Europe and with which the bureau has been previously unsuccessful. Down to the time of the present writing nothing has been recovered from this liberation, but as past experience has shown, dispersion is often so great and so rapid that recoveries of imported parasites are often not made until the second and even the third year. The nonrecovery of a liberated parasite the first year after liberation by no means indicates nonsuccess. On the other hand, another important parasite, referred to in the last report as having been found by Mr. Fiske in Sicily, although previously known only from Russia and of which 125,000 cocoons were sent over, survived the winter successfully in Massachusetts, and during May and the first half of June, 1912, about 12,000 adults were put out in the field. Another species of Apanteles, which was received in small numbers, passed through the winter in good condition and a small colony has been placed out. The females of this species laid their eggs in small caterpillars and the insect has now passed through a generation since it arrived in this country. Several other species which were imported last year and which were mentioned in the last annual report were colonized during the late summer and autumn of 1911.

The egg-parasites of the gipsy moth which have been colonized during the past two years were both recovered in the field late in the summer of 1911. *Anastatus bifasciatus*, a species having one generation annually and coming from both Japan and southern Europe, was found to be breeding in practically all of the places where it has been colonized. This species spreads very slowly, however, and it is necessary to make many plantings in order that it may become generally distributed. In some of the collections of egg masses as high as 47 per cent of the eggs were found to be parasitized. More than 700 additional colonies of this species have been put out during the spring of 1912.

The distinctive Japanese egg parasite, *Schedius kuvanæ*, especially mentioned in the last report, has been recovered in several localities where plantings had previously been made. In some places an enormous number of the parasites were present and were ovipositing in gipsy-moth egg-masses. This species has several generations each year, and the outlook for its perfect establishment and future spread is more favorable than it was last year. This is especially satisfactory, since 18 months ago it was thought that the insect had been lost and that it had been unable to withstand the New England winter—a most unfortunate situation if it had been true, since it is readily handled in the laboratory and may be reared literally by millions in confinement.

The European Calosoma beetles have become thoroughly established and have caused much destruction among the gipsy-moth caterpillars and pupæ, and in many parts of the infested region they are becoming so abundant that they attract the attention and respect of casual observers.

The parasites of the brown-tail moth have increased and spread over a much larger territory than last year. The trend of dispersion has been in a north and northeast direction, and has followed the same general lines as the brown-tail spread. One species, *Monodontomerus æreus*, has been found beyond the city of Bangor, Me., and as far north as the brown-tail moth has spread in New Hampshire. In Massachusetts and Rhode Island the spread of this species very nearly covers the range of the brown-tail moth. Another one, *Apanteles lacteicolor*, has been recovered from more than four times the area in which it was recorded last year, and is showing a satisfactory rate of increase. Still another, *Meteorus versicolor*, an excellent parasite of the brown-tail moth, has spread more rapidly during the past year than at any time since it was first liberated. The first of the brown-tail moth winter-nest parasites to be found established in this country, and to which frequent reference has been made in these annual reports, namely, *Pteromalus egregius*, has also shown a good increase and spread over the previous year.

In the furtherance of the proposed study of European conditions, especially regarding parasite control there, Mr. W. F. Fiske, with two expert assistants, has been located in southern Europe since December, making his headquarters in Italy and traveling through southern Germany, Austria, and France, securing data and ascertaining the best points in which to make studies and from which to send material during the present summer.

ATTEMPTED IMPORTATION OF INSECT ENEMIES OF THE WHITE FLY.

The discovery of what is apparently the original home of the white fly of the orange in India was announced in the last annual report, and the discovery of certain natural enemies was mentioned. Two of these important enemies, namely, an internal parasite and a predaceous lady-beetle, were successfully brought from India to Florida by Mr. R. S. Woglum, of the bureau, and in good numbers, in the autumn of 1911. Apparently, however, they failed to survive the winter. This failure was most unfortunate, and probably can be obviated from the experience now gained in the case of future shipments. The winter of 1911–12 was exceptionally severe, and Florida climatic conditions were quite different from those which hold in the original Indian home of the parasites. It is probable that better success will come by importing this material not later than midsummer rather than in the autumn, or, if an autumn importation is again found necessary, by establishing such conditions in Florida as will be favorable for active breeding during the winter instead of attempting to carry these beneficial insects through a condition of hibernation, as was done with this first sending. It must be frankly said that it is not expected that these beneficial insects will prove a complete remedy for the white fly in Florida or elsewhere, but there is a possibility that they will be useful, and until this possibility has been fully demonstrated one way or the other it will probably be worth while, at a favorable time, to repeat the experiment. Definite knowledge of the apparent failure of the experiment was gained too late to make it desirable to send another expedition the present year.

IMPORTATIONS OF PARASITES OF THE ALFALFA WEEVIL.

The Italian parasites of the alfalfa weevil sent over in March and April of 1911, referred to in the last annual report, have made little progress. During the spring of 1912 an agent was sent to join the gipsy-moth parasite party in southern Europe, and during the early months of the present year the attention of the gipsy-moth parasite experts was also diverted to some extent to the investigation of the possibilities of importing alfalfa-weevil parasites. As a result a much larger number of parasites of the alfalfa weevil have been brought over from Italy, Germany, and Switzerland than it was possible to obtain last year. A stronger and better-trained force of men has been stationed in Utah to handle the material received, and during June of 1912 the imported parasites were being reared in Utah from alfalfa stems and other material received from Europe and were being liberated into the fields infested by the weevil—a course that was impossible last year on account of the limited amount of material imported. There seems little doubt, from the investigations in Italy during the spring of 1911 and the spring of 1912, that the weevil is largely controlled in that country by its native parasites. It remains to be seen whether a similar condition of affairs can be brought about in our Western States, which depend so largely upon their alfalfa crop and which differ so greatly in many places from the climatic conditions of Italy. The attempt seems to be well worth while when carried on simultaneously with remedial efforts in other directions.

EXPORTATIONS OF USEFUL INSECTS.

During the year parasites of scale insects have been sent to Peru, to Argentina, to Italy, and to Spain. Parasites of tobacco insects have been sent to the Tobacco Planters' Association of Deli, Sumatra, and an egg-parasite of one of the important tobacco pests has reached Sumatra in good condition via Amsterdam and has been liberated in living condition. The spread of the brown-tail moth in the Province of New Brunswick was mentioned in the last annual report, and brown-tail moth parasites, introduced into this country from Europe and established in New England, have been sent to New Brunswick, to an agent of the Central Experimental Farm of the Dominion of Canada, who has liberated the parasite material, which gives promise of success equal to that of New England.

During the year the results have been announced of the importation into Italy from the United States, through this bureau, of an internal parasite of a scale insect which promised the destruction of the mulberry plantations in that country. Dr. Antonio Berlese, of Florence, in a recently published paper in which he goes into the question of the spread of this American parasite in Italy, announces the following conclusions: (1) The American parasite is perfectly adapted to the climate of upper Italy; it multiplies more actively in the milder regions than in the colder regions, having probably one or two generations less in the latter; (2) excessive cold, however, is not injurious to the parasite; (3) the diffusive intensity of the parasite is so great that it will disperse throughout upper Italy even without being aided artificially. During the present year the States of Liguria and Venetia will be for the greater part freed from the scale. The same condition will be reached for Lombardy in 1913 and for Piedmont in 1914.

It becomes more apparent every year that the United States, by aiding foreign countries in this way, is not only performing a courteous and helpful service to others, but is most emphatically benefiting itself, since return service of a similar kind and of an important nature is willingly and courteously rendered.

WORK ON INSECTS INJURIOUS TO SOUTHERN FIELD CROPS.

The work on insects injurious to southern field crops dealt with six specific lines of investigation, as follows: (1) Cotton-boll weevil; (2) tobacco insects; (3) sugar-cane insects; (4) the Argentine ant; (5) rice insects; (6) the cotton red spider. In addition several miscellaneous problems received attention. The work of this section has been carried on as before under the supervision of Mr. W. D. Hunter.

THE COTTON-BOLL WEEVIL.

The work on the cotton-boll weevil problem consisted of the testing of control measures, both direct and indirect, such as the encouragement of parasitic enemies; the determination of the status of the insect from time to time throughout its range; the mapping of the new territory invaded; and various incidental matters.

The experiments in practical control were conducted largely in the Mississippi-Yazoo Delta, where a laboratory was maintained throughout the season. On typical plantations in this region extensive series of tests were instituted to determine the value of hand picking the early appearing weevils and the infested squares. Some years ago the practice was tested thoroughly in Texas, with the result that it appeared to be extremely doubtful whether the benefit to the crop would ever offset the expense involved. In Louisiana and Mississippi, with conditions quite different from those in Texas, the practice may be found to be more feasible. The experiments of the season dealt with pickings beginning at different dates in the spring, continuing to different dates in the summer, and with different time intervals between the pickings. The work was designed to determine at what date the work could be begun to advantage and when it should be discontinued, and also whether a period of 5, 7, or 10 days between the pickings would be the most advantageous. The experiments were conducted under practical conditions on different plantations and supplied a large amount of data. The work of the season, taken in connection with results obtained previously and others that will be secured, will show accurately what may be done by this practice under different conditions of season and plantation management.

The experiments to determine whether the burial of the cotton stalks or the infested squares can be depended upon to take the place of the burning of the stalks were continued. As in the square-picking experiments, this work was conducted on several plantations in the heavily infested territory. It was found that within certain limits approximately the same results as follow from burning of the plants could be obtained by deep plowing. This was noticeably the case in plowing under the infested squares at the time the weevils become so numerous as to destroy all of the fruit as it formed. The value of the process depends upon local conditions of soil and rainfall. The results of the season's work add considerable definiteness to the information that has been available hitherto and promise to show one method whereby the loss of organic matter incident to the burning of the stalks may be avoided.

Experiments in poisoning the boll weevil by means of powdered arsenate of lead and other arsenicals were conducted on several plantations. About 135 acres were utilized in the plats. In some cases the experiments resulted in a practical advantage to the planter; in others there was a loss. In general, however, a profitable outcome resulted where the number of applications was small. This indicates that there will be a distinct field of usefulness for the poison against the weevil, but many questions regarding the practical application of the method remain to be worked out.

The work on the parasites of the boll weevil consisted of life-history investigations of a number of species, the introduction of certain forms from the older infested territory into the humid region, and the local concentration in that region of parasites already present.

The investigation of the life-history and habits of the boll-weevil parasites is necessary to reveal feasible means of propagation and introduction. Along this line very satisfactory progress was made. The work in parasite introductions consisted of the shipments to Louisiana of large quantities of weed stems infested with parasitized weevils related to the boll weevil. This work was done during the winter, and observations were made in the spring and summer to determine whether the introduced species were able to maintain themselves. The experiments in local concentration of parasites consisted of the collection of large quantities of cotton squares in the immediate vicinity of the point where the experiments were conducted and their concentration in suitable release cages in limited areas on the plantations. As in the case just mentioned, a very large amount of work was required to obtain the material and to make the detailed observations that were necessary in order to interpret the results.

During the season considerable work was done toward bringing about uniformity in the quarantine regulations designed to prevent the introduction of the boll weevil into States or parts of States that have not become infested. The outcome was a meeting held in Atlanta, Ga., during December, 1911, at which the representatives of the States concerned reached an agreement regarding a uniform system of quarantines which will remove many of the objections to the various systems that have been in effect.

As has been the case in previous years, there was considerable demand for information concerning the exact status of the boll weevil during the season. To supply the information it was necessary for agents of the bureau to make careful examinations throughout the infested territory. The approximate number of weevils hibernating successfully was thus determined by early field examinations, and the probability of damage in different localities was forecasted. This information was utilized extensively by planters and the cotton trade generally.

The agents of the bureau obtained accurate records of the experience of a large number of practical planters in producing cotton under boll-weevil conditions. These records dealt with the cultivation of a number of varieties under different conditions, planting at different dates, variations in spacing, and many other cultural practices. The records will be used in due time to supplement the records of the accurate field experiments of the bureau.

TOBACCO INSECT INVESTIGATIONS.

The principal work on tobacco insects consisted of investigations of means of control of the so-called hornworms and demonstrations based thereon, the demonstration of methods of control of the tobacco wireworm in Virginia, a study of the control of the cigarette beetle, and a preliminary investigation of the causation of the so-called mosaic disease of tobacco by insects. The main work of the investigations was conducted at Clarksville, Tenn., while the work on the wireworm was centered largely at Appomattox, Va.

The principal work on the hornworm was designed to furnish satisfactory means of control by chemicals. A large number of arsenical preparations were tested. In several instances these preparations were made up especially for the bureau by manufacturing chemists. It was fully determined and demonstrated on a small scale that arsenate of lead is an almost perfect remedy for the hornworm. This discovery will eventually cause the discontinuance of the use of Paris green, which, though generally used, has been found to do damage to the tobacco that has not been appreciated. In this work indications were obtained that poisons even more satisfactory than arsenate of lead may be found as the result of future investigations.

The demonstrational work, which was necessarily conducted on a small scale on account of the shortage of funds, was well received by the planters and will undoubtedly result in the adoption of greatly improved methods.

The work on the cigarette beetle revealed the fact that the pest is of considerably more importance than has been supposed. It was possible to utilize only a small portion of the time of one agent on this work. As opportunities arose, however, experiments with different fumigants and in attracting the beetles by various means in the warehouses were instituted.

The work on the tobacco wireworm in Virginia was restricted largely to the investigation of means of direct control and demonstrations. All experiments and observations have shown that the most effective control consists of freeing land from such weeds as are the natural food plants of the insects. It was found that this could be brought about by several methods. One of them is a proper rotation of crops; another, the summer plowing of the fields; and another, the use of lime. In the experiments with lime it was found that sheep sorrel, one of the plants upon which the wireworm breeds in great abundance, would not grow where even a comparatively small amount of the substance had been applied. The lime also had a remarkable effect in decreasing the number of other natural food plants of the wireworm. These results will form a foundation for a system of control that will be well adapted to the conditions in the tobacco regions of Virginia. A large number of experiments with insecticides against the wireworm were conducted, but without satisfactory outcome.

SUGAR-CANE INSECT INVESTIGATIONS.

The work of the investigation of sugar-cane insects dealt largely with the borer, which is by far the most important enemy of the crop in the United States. It has been supposed that this species attacks corn and sugar cane indiscriminately. Early in the season, however, the question arose as to whether the insect infesting corn was not distinct from that injurious to sugar cane. The means of control that have been suggested were based upon the supposition that the borers in corn and sugar cane were the same. It therefore became necessary to investigate the matter thoroughly. At the laboratory at New Orleans experiments soon showed that the same insect attacks corn and sugar cane in that vicinity. It is therefore clear that the two crops must be taken into consideration in any plan of control.

An experiment was undertaken on the grounds of the Louisiana Sugar Experiment Station, near New Orleans, to bring about the total eradication of the cane borer. The conditions at this point were ideal for an experiment of this kind, the results of which could be applied in varying degrees on all sugar plantations in the South. In this experiment it was planned to exclude all cane that was not fall planted, to collect and burn all trash, cane tops, and similar débris left in the field, to uproot and destroy the stubble, so that no cane except that fall planted would occur on the grounds, to do away with windrowing the canes, and to plant the corn on the station grounds later during the season in order to deprive any of the moths that might have survived the operation described of any opportunities for breeding. This experiment, which has been made possible by the hearty cooperation of the Louisiana Sugar Experiment Station, when completed, will be of the utmost value to planters in the control of an insect which causes a loss of several hundred pounds of sugar per acre throughout the greater portion of the cane belt.

Another effort was made to introduce an important insect enemy (*Cryptolæmus montrouzieri*) of mealy bugs to attack the sugar-cane mealy bug in Louisiana. One shipment was obtained from California and released in a plat of cane at the experiment station. Another was liberated at Adeline, and a third in a large hothouse at Audubon Park. The individuals in all of these shipments seemed to thrive for some time after they were introduced and two generations were reared. However, the winter conditions were evidently not suitable for the insects, as none survived. These experiments seem to demonstrate that there is no hope of obtaining control over the mealy bug in Louisiana by the introduction of the Cryptolæmus.

The work on sugar-cane insects was conducted in close cooperation with the Sugar Planters' Association of Porto Rico. That association sent an agent to southern Mexico to obtain parasites of the borer. Such enemies of the insect are entirely absent in Louisiana. Any material that is obtained by the Porto Rico station will be shared with the bureau for experiments in introduction in Louisiana. In line with this cooperation the bureau assisted in the shipment of the predatory beetle *Cryptolæmus montrouzieri* to Porto Rico. This species, as has been noted, failed to establish itself in Louisiana, but it was supposed that the conditions in Porto Rico might be more favorable. Large numbers of specimens were obtained from California for forwarding to Porto Rico. At New Orleans they were fed and repacked for shipment. The reports from Porto Rico up to the present time indicate that the introduction will probably be successful.

WORK ON THE ARGENTINE ANT.

The main line of work undertaken on the Argentine ant was a large-scale test of a method of extermination which appears to have been followed successfully in California. The method in brief is to expose jars containing a very dilute mixture of sodium arsenite with sugar so that the ants will visit them and be poisoned. In the work in California the mere placing of receptacles containing this preparation appears to have resulted in the extermination of the ants. At Hattiesburg, Miss., this method was tested on a series of colonies of the ant which infested about five city blocks. Several hundred jars containing the poison mixture were exposed during the fall of 1911, under a cooperative agreement with the city authorities. This method shows its effects slowly and it will be necessary to prosecute the work through another season to determine whether it is an effective method of combating the ants. Another line of work was directed against the ants in orange groves, where they have been the indirect cause of the loss of many trees. The system of traps described in the preceding annual report was tested on a considerable scale and its practicability within certain limits was demonstrated. Other work relating to the Argentine ant consisted of the determination of the spread, experiments with a large number of poisons that had not hitherto been tried, and the relation between the ant and other insects. In connection with the last study it was determined that the ant protects the sugar-cane mealy bug and thereby becomes of importance in connection with cane culture. In the orange groves it protects the plant lice feeding upon the trees and at the same time drives away the enemies of the plant lice and of other insects destructive to the trees. In addition to the weakening and death of many of the orange trees in the manner described it was found that the ant indirectly causes the trees to be more susceptible to frost. In a number of cases where observations were made on trees to which the ants had access and where, consequently, the enemies of the trees were protected, considerable loss from freezing occurred during the winter, while trees from which the ants had been excluded were not affected. Substantial progress was made in the control of the ant in orange groves by the use of special sticky mixtures applied with brushes to the trunks of the trees.

RED SPIDER ON COTTON.

The work on the red spider on cotton was conducted at Batesburg, S. C., although the agent engaged in this work made a survey at the end of the season to determine the extent of red-spider injury in other States. At Batesburg the principal efforts were directed toward practical demonstration of economical means of control. Success was attained by several methods. Previous findings in regard to the importance of cultivated violets in carrying the spiders through the winter were verified. Where the pests were destroyed on the violets in dooryards it was found that such infestations of adjoining cotton fields as had been of regular annual occurrence were prevented. In another experiment the wild plants which support the cotton red spider and grow in the immediate vicinity of cotton fields were destroyed by burning before the infestation of the cotton field had begun. By this means the spider was destroyed and no infestation of the cotton field occurred. Methods were also devised for use in cases where it has not been possible to prevent the invasion of the fields. In one experiment the first few cotton plants that became infested were pulled out, carried from the field, and destroyed. In this way a single field which had shown damage each season was kept clear. In another experiment the plowing under of cotton planted broadcast near the edge, which served to concentrate the spiders on their migration from the original host plants to the cotton, checked the invasion completely. It was also discovered that the use of a solution of potassium sulphid in water is an economical and effective method of destroying the spider when it has invaded a field. By this means the agent engaged in this work prevented the spread of the red spider by the application of a spray which cost only 75 cents per acre.

The survey of several of the eastern cotton States to determine the amount of damage caused by the red spider, to which reference has been made, resulted in a determination of the fact that injury is spread over a very wide territory. Throughout the States of North Carolina, Georgia, Florida, Mississippi, and Alabama the spider was found in the cotton fields. In many places in these States the injury was as severe as in South Carolina. It has generally been overlooked by planters or considered to be some sort of rust.

RICE INSECTS.

The work on rice insects was conducted at Crowley, La., where excellent facilities were furnished by the Louisiana experiment station. The main work on rice insects was with the so-called rice water-weevil. In addition to the study of the life history of the pest, considerable work was done in practical control by management of the water. It was found that the weevil is checked to a very considerable extent by such draining of the fields during the growing season as is not sufficient to affect the rice materially. These observations have led to an extensive series of experiments to determine exactly how the water used in flooding the fields may be manipulated to check or greatly reduce the ravages of the weevil.

Observations were made on a number of minor enemies of the rice plant, some of which will eventually require careful consideration. Up to the present time, however, it has been necessary to concentrate the work on the principal species affecting the crop.

MISCELLANEOUS.

During the year an opportunity arose for testing various forms of electricity, including Roentgen rays and high frequency currents. for their possible utility in the destruction of injurious insects. The work dealt largely with the determination of the possibility of sterilizing insects by means of Roentgen rays, as it was to be assumed that insects might be affected somewhat in the same manner as human beings are known to be. A rather elaborate apparatus was placed at the disposal of the bureau and tested at New Orleans. The results, although extremely interesting from a scientific standpoint, did not reveal any points of practical value. It was found that the Roentgen rays have apparently no effect whatever on the sexual organs of the insects.

At the Dallas laboratory much work was done to determine the relative toxicity of a large number of poisons on different species of insects. In this work the killing dose, the physiological effects on the insects, and the effects on the soil were considered.

In cooperation with the South Carolina experiment station work in the practical control of the cotton root-aphis and cotton wireworm was conducted at Marion, in that State. Some of the results have been published by the South Carolina station.

During the season there was an unexpected outbreak of the cotton caterpillar throughout the Southern States. This insect was formerly the most dreaded enemy of cotton in the United States, but for about a quarter of a century has not attracted much attention. During the year, however, there occurred an outbreak practically as extensive as any that had been recorded. Observations on this phenomenon were made and through publications and letters advice was given the planters regarding the control measures to be practiced.

INVESTIGATIONS OF INSECTS DAMAGING FORESTS.

The work of the bureau on insects affecting forest trees and crude and finished forest products has been carried on during the year under the direct supervision of Dr. A. D. Hopkins, as in previous years, and the same general lines have been followed. There has been a continued effort to demonstrate the practicability of preventing a large percentage of the waste of forest resources heretofore caused by insects, and there has, in consequence, been a greatly increased interest in the subject on the part of small and large private owners of timberlands as well as by State and Federal officials who are charged with the management of public forests. There has been a more general adoption of insect-control policies in connection with other advanced methods of forest protection, and also a more general confidence in expert advice on matters relating to the control of injurious insects.

The principal injuries of the year have been, as before, by the Dendroctonus beetles on the pine, spruce, and fir of the Northwest and Pacific Coast States, and on the pine of the South Atlantic and Gulf States. In sections where no attempt has been made by private owners or public officials in charge to control the depredations a great waste of forest resources has continued, but in certain sections where proper efforts have been made in the way of control the waste has been reduced or entirely stopped. The hickory barkbeetle has caused the death of a large number of young and old trees in the North Atlantic and Great Lakes States, but information given out from the bureau has resulted in a large amount of successful control work carried on by the owners of woodlots and by superintendents of municipal and private parks.

The ravages of the so-called chestnut bark disease attracted a great deal of attention during the year, and recent investigations have indicated that certain insects with bark-boring habits are intimately associated with this disease and with other diseases affecting the chestnut. In fact, the evidence seems almost conclusive that the infection of the living tissue and the ultimate destructiveness of the disease is largely dependent upon primary injuries by insects. Damage to telephone and telegraph poles, mine props, posts, and railroad timbers is becoming more noticeable and is causing greater loss on account of the increasing values.

An interesting form of insect damage to forest interests is coming to the front in the way of damage by insects to the cones and seeds of pine, Douglas fir, and balsam fir. Investigations in California have shown that this damage amounted to from 25 to 90 per cent of the available supply. In one locality the forest officials planned to collect 1,000 pounds of yellow-pine seed, but it was found that 90 per cent of the cones were infested by a seed-destroying caterpillar, and the work was abandoned. It was also found that the sugar-pine cones in two National Forests were damaged by a scolytid beetle, and it was estimated that from 25 to 35 per cent of the cones were destroyed.

FIELD DEMONSTRATIONS IN PREVENTION AND CONTROL.

With the increased appropriations made for this section of the work of the bureau for the fiscal year 1911–12, it was possible for the first time to thoroughly systematize the work of field demonstrations and to carry them on with a greater measure of success. The main feature of the field work during the year has been to carry on field demonstrations in the practical application of the recommended methods of preventing or controlling damage by Dendroctonus beetles on living pine, spruce, Douglas fir, and larch. Nine forest insect field stations have been established and at each of these stations work has been conducted under the direct supervision of an entomological assistant who is helped by especially trained agents. Briefly summarized, these stations have begun their work in the following way:

Station No. 1 is located at Columbia Falls, Mont., and covers an area including the States of Montana, North Dakota, South Dakota, Nebraska, Kansas, and Colorado, and parts of Wyoming, Idaho, and Washington. The work at this station during the year included investigations, instructions, and demonstrations on private, State, and Federal lands, involving more than 60,000 infested trees. The principal demonstration project was located in the Tongue River Indian Reservation. In the spring of 1911 it was shown that there was an extensive outbreak of the Black Hills beetle, the timber killed being estimated at about 3,000,000 board feet. Cooperative work was carried on with the Bureau of Indian Affairs of the Department of the Interior, that office having allotted $11,000 for this purpose. About 6,000 trees have been cut and barked and much of the infested timber is being converted into lumber which yields a clear stumpage value of $6, which will go far toward covering the cost of the operations. The work will probably be brought to a successful termination by the end of July, 1912, and the threatened destruction of a vast amount of timber will have been stopped.

Another project under this station is at Swan Lake, Mont., and includes private, State, and National forest timber. About 45,000 trees had died or were infested by the mountain pine beetle. A special arrangement was made between the Forest Service, the State officials, and the private owners, and control work was begun about the middle of February, 1912, under the advice and instructions of a representative of this bureau. The sum of $6,350 was allotted by the three interests involved, and about 30,000 trees have been marked for felling.

Other work has been done by this station at various points in the territory included in its operations.

Station No. 5 is located at Yreka, Cal., and its work covers an area including California, Arizona, New Mexico, and a small section of western Nevada. Two important projects are under way. One is located on Moffit Creek, on private lands, where the owners have paid the expense of operations under the direct supervision of a representative of the bureau. The other project, designated as the Craggy Mountain project, covered both National Forest and private lands to an extent of 15,000 acres. Here 927 large trees were treated at a cost of about $3,000, the cost being met by the Forest Service. Prior to this time a reconnaisance made by forest officials indicated that during a period of 30 years previously the accumulation of insect-killed timber had amounted to from one-fourth to one-half of the total stand, and it was found that the same condition is common in the forests of California and Oregon. It is prophesied that the work carried on under this project will be an effective demonstration to individual owners and to States that this injurious work of the beetles can be stopped at a minimum of expense.

Station No. 6 is located at Klamath Falls, Oreg., and covers Oregon, Utah, the greater parts of Nevada and Washington, the south half of Idaho, and a small section of western Wyoming. The main demonstration project undertaken by this station was on 8,800 acres, the property of several private owners, in the vicinity of Parkers Station, Oreg., where there was a heavy infestation by the western pine beetle and a lesser one by the mountain pine beetle which indicated widespread depredations in the immediate future. The trees requiring treatment were very large, the sugar pine averaging 33 inches diameter breast high and the yellow pine 22½ inches diameter breast high. In all 300 trees, containing a total of 538,000 board feet, were treated at an expense of less than $2 a tree. The low cost of this demonstration should serve as an object lesson and will doubtless do much to bring about that spirit of cooperation among timber owners which the bureau is trying to arouse.

Work on the Whitman National Forest, coming under the work of this station, was terminated June 30, 1911, but the months of July, August, and September were devoted to a complete study of the area worked over, as well as to adjoining untreated areas, to secure data on which to base conclusions as to the results of this work.

Station No. 7 has been located at Spartanburg, S. C., and its work covers an area including North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. Since great damage was threatened by the southern pine beetle in these States, as referred to in the last annual report, the necessity for concerted action by owners of pine in these States during the fall and winter of 1911–12 was perfectly obvious. This station was started in consequence, and every effort was made to stir up an interest in the subject among the owners of the trees. The southern press assisted actively; addresses were made by experts throughout the infested region; placards were posted in the post offices, and field demonstrations were carried on. There was a general awakening as to the danger and active cooperation was aroused not only among the holders of large tracts of timber but by the thousands of small woodlot owners, and control methods were put into actual practice. An examination made during May, 1912, of the districts where the southern pine beetle was most prevalent shows without question that the ravages of the southern pine beetle have been effectually checked and possibly completely ended for the time being. This is a somewhat remarkable and very gratifying achievement, but a still more gratifying result of this widespread dissemination of information on this subject is that the owners of pine in this region seem to have become so familiar with the methods of control that these methods are likely to be a matter of general routine in the management of timber and recognized as a necessity, just as diversity in crops and the fertilization of agricultural lands are recognized. The actual amount of infested pine cut and treated during the past winter can never be definitely determined, but the evidence furnished by the stumps of the trees and by general information from owners of the timber in parts of the South where the damage had been greatest indicate that an enormous amount of infested pine has been cut. A further indication is the fact that so much cordwood has been offered in the open market in many localities as to lower the price much below that of previous years.

It may be worth while to mention one notable example of successful control at direct expense. This was a 90,000-acre tract, partly in South Carolina and partly in North Carolina. On this property there were thousands of dollars' worth of beetle-killed timber, and there was every indication that the damage would be even greater this year. Sixty infested patches of timber, ranging from 3 to 300 trees, were cut and burned on the ground during the winter of 1911 at a direct cost of $373. Reports from this tract in the spring of 1912 indicate that almost no pine is dying.

SPECIAL RESULTS.

Among the special results of the work of the year are the successful demonstrations to representatives of timber lands and to some of the State and Federal officials that the control of the Dendroctonus beetles in the pine forests of the West and South is not only possible, but that protection of standing timber from insect damage is just as necessary as protection from forest fires, and that such work is directly in line with profitable business methods. The continued healthy condition of the timber in all of the areas where successful control work was carried on, as mentioned in former reports, serves as the most convincing evidence of the practicability of preventing an enormous waste of forest resources.

Conclusive results of the demonstration control work of the last fiscal year will not be entirely evident until July of the present year (this report being written on the closing days of June), but preliminary reports on the thorough examination that is now being made of the several treated and adjacent untreated areas show not only that the control measures have resulted in a direct saving of timber on the areas treated, but that the results have been so obvious that the public in general will undoubtedly apply control measures in other localities.

The results of the active work carried on in the South during the summer of 1911 are among the most important achievements of this branch of the bureau. They are shown, (1) in a greater interest in the subject of protecting pine of the farmers' wood lots and the turpentine and timber forests from the ravages of the southern pine beetle; (2) in the fact that an enormous amount of beetle-infested timber was cut into cordwood by farmers and owners of timberlands during the fall and winter in strict accordance with the instructions given in Farmers' Bulletin No. 476, prepared in this office; and (3) in the evidently complete control of the depredations in the sections in North Carolina and Georgia where the greatest damage was done by the southern pine beetle during the summer and fall of 1911, involving the death of many millions of cords of timber of different sizes.

Cooperation with the Forest Service has been continued and has resulted in the adoption by that service of a definite insect-control policy for the National Forests based on the results of investigations and recommendations of representatives of the Bureau of Entomology. Further cooperation has been carried on with the Indian Office of the Interior Department, and with private owners in South Carolina, North Carolina, and other Southern States, in California, and in Oregon.

Especial investigations in addition to the demonstration work have been under way, and many species have been studied.

INVESTIGATIONS OF INSECTS DAMAGING DECIDUOUS FRUIT TREES.

Investigations of insects injurious to deciduous fruits, vineyards, and nuts have been carried on as heretofore under the direction of Mr. A. L. Quaintance. Some of the projects under way at the close of the last fiscal year have been continued and enlarged, and additional ones have been undertaken.

THE PEAR THRIPS.

Studies of the life history and habits of the pear thrips in California have been continued at the bureau's laboratory at San Jose, and additional important information obtained. Each season presents variations in the behavior of this insect in orchards, especially in regard to the time of its appearance on trees in the spring and the relative number present at a given time. These variations must be carefully considered in order to accomplish effective remedial work, and considerable attention has therefore been given to determining the relation of temperature and rainfall to thrips emergence.

In orchards large-scale spraying operations have been conducted. Three years ago certain orchards were selected in the Santa Clara Valley in which to carry out for several successive seasons the recommendations of the bureau as to spraying, cultivation, and other orchard treatments relating to thrips control. This work has been quite successful, and has served as object lessons to the fruit growers. During the spring of 1912 five of the bureau's agents in California were assigned to the thrips work and were located at different points in the infested territory in a way to give the largest amount of assistance to orchardists in the preparation and application of sprays. A large amount of spraying for the thrips was thus accomplished under the direct supervision of the bureau, aggregating from 10,000 to 15,000 acres of orchards. The results indicate that this work has been quite successful, and a large crop of fruit, it is expected, will be harvested from the treated orchards. On the other hand, orchards not sprayed are represented to have very little, if any, fruit on account of the ravages of the thrips.

In California the insect has not notably extended its range beyond the general territory infested. It is, however, appearing in orchards within this territory in which it was previously not known, and it will soon doubtless be uniformly distributed throughout the deciduous fruit-growing area in the San Francisco Bay region.

Unfortunately, the pear thrips has made its appearance in other parts of the country, as in the Hudson River Valley in New York State, where it was found by the Geneva Agricultural Experiment Station in the neighborhood of Germantown doing injury to pears. The same institution has also determined that the insect occurs in orchards at Geneva, N. Y., and the pear thrips has been discovered by the Bureau of Entomology in several orchards in the vicinity of North East, Pa. Its spread and injuries will be watched with care.

GRAPE PHYLLOXERA.

Satisfactory progress has been made in the investigations in California of the grape Phylloxera. The life-history studies in progress in the laboratory at Walnut Creek, headquarters for the work, have thrown light on several points in the biology of the insect, and some of these have already been verified under vineyard conditions. Thus it has been definitely determined that the winged migrant form of this plant louse is developed in numbers under California conditions, a fact heretofore disputed, which has an important bearing on its dissemination in vineyards. The winged adults have frequently been reared in the laboratory, and the nymphal stage of the winged form has been taken in vineyards and subsequently reared to adult in confinement.

In the field investigations have been carried out principally along two lines, namely, (1) the collection of information on the history of the Phylloxera in the State and its injuries and spread in the vineyards, and (2) the determination of the relative resistance to the insect of roots of different varieties of grapes, the latter work in cooperation with the Bureau of Plant Industry of this department.

Under the first heading the inquiry relates to damage done by the Phylloxera alone to vineyards and damage resulting from the combined influence of the Phylloxera and other causes, as improper drainage; the relative freedom from Phylloxera of vineyards grown on various roots; and the effect on Phylloxera abundance and injury of different cultural methods.

In the determination of the relative resistance to the insect of the roots of various varieties of grapes, plants are grown in the nursery and also in pots. The pot work permits of more accurate observations of the condition of the vines and of the insects than with plants grown under out-of-doors conditions, and is a valuable check on the latter. Comparative studies are in progress on the root galls produced by the insect on varieties of grapes showing varying degrees of resistance to determine if possible the reasons for the comparatively less injury to some sorts than others.

WOOLLY APPLE APHIS.

The woolly apple aphis has long been complained of by orchardists, but its injuries during recent years have apparently been on the increase. As a result, there have been frequent requests for more effective treatments than those commonly recommended against it. The investigation of this insect already under way has been materially strengthened and includes a thorough life-history study of the insect at the Vienna (Va.) laboratory and tests of a large series of substances likely to possess value in its control, both in nurseries and orchards.

While nurserymen and orchardists of certain other countries have for many years made use, in their propagation work, of the roots of varieties of apples resistant to the aphis, American nurserymen, with one or two exceptions, have given little if any attention to this subject. There appears to be no question whatever that injuries from this pest to the roots of apple trees may be avoided by the employment of the roots of certain varieties of apple in a way similar to that which is followed in the case of the grape Phylloxera. Especial attention, therefore, is being given to determine the relative degree of resistance to aphis attack of the roots of our principal commercial as well as other varieties of apple. A collection of apple grafts and seeds has been planted, and the plants when ready for distribution will be tested as to aphis resistance in different parts of the country.

THE CODLING MOTH.

Studies of the codling moth which have been under way during the past several years in different fruit sections representing different climatic conditions are being continued. The life-history studies in progress in Michigan during 1911, as mentioned in a former report, were completed at the close of that year, and a report on the work is now in press. Also the life-history investigations which have been in progress in the Santa Clara Valley in California have been completed and a full report on the subject has been submitted for publication. The bureau has received considerable complaint from apple growers in portions of New Mexico, and in other southwestern States, of their inability satisfactorily to control the codling moth on apples and pears by the methods found effective in the East. Beginning with the spring of 1912 it was found practicable to establish a laboratory at Roswell, N. Mex., to which is tributary a large fruit-growing interest. Careful attention is there being given to observations on the habits of the codling moth, and large-scale spraying experiments are in progress in orchards to determine the proper schedule of applications to be followed under the conditions there existing.

The tests in progress during the fiscal year 1910–11 of the so-called one-spray method in comparison with the usual schedule of treatment followed in the East were concluded at the close of the growing season of 1911, and a full report on the subject is now in the course of publication. It was determined that a high degree of efficiency in the control of the codling moth and plum curculio was obtained from a single application of spray made immediately after the falling of the petals. In the case of varieties of the apple little subject to fungous diseases, the one-spray method would appear to be of much value under eastern conditions. The investigation further developed the very important point of the necessity for greater thoroughness in spraying at the time of the falling of the petals than has generally been followed by orchardists.

Owing to the prevailing differences of opinion between certain eastern and the western entomologists in regard to the condition at spraying time of the structures at the calyx end of the apple, a careful inquiry has been begun in Michigan and New Mexico, representing humid and arid conditions, respectively, to determine the condition for many varieties of apple of the so-called calyx cup during the two or three weeks subsequent to the falling of the petals. This information will have a distinct bearing on the character of spraying to be done to best insure poisoning the calyx cup, the prime essential in codling-moth control.

Demonstration spraying for the codling moth, as in former years, is being carried out in connection with other work in some of the bureau's field stations, notably in Michigan, New Mexico, and, during 1911, in Delaware. This work has been much appreciated by orchardists in the neighborhoods where located and has resulted in a distinct improvement in the character of work done by them in their own orchards.

The investigations of the codling moth throughout the Appalachian Mountain region, begun in the spring of 1911, are being continued. Last season's work indicated the importance of a thorough knowledge of the insect throughout this region, due to the variation in its behavior under the different conditions of altitude in which apples are grown. Band records and life-history observations are being made at 10 or 12 different stations located at representative points in western Maryland, Virginia, and West Virginia.

THE GRAPE LEAFHOPPER.

The grape leafhopper has during recent years become very troublesome in vineyards in the Lake Erie Valley, and special effort has been made to perfect a treatment for its control. The spraying experiments and demonstrations carried out in vineyards in 1911 have shown conclusively that great benefit may be obtained by the proper use of nicotine sprays directed against the immature stages or nymphs of this insect. This work, however, has shown the necessity of a more detailed knowledge of the life history of the pest, especially as to the period over which the insect in the immature stages will be found on the vines, and the present season's work will be devoted largely to questions in its life history as contributing to a more effective spraying schedule. A report has been prepared and submitted for publication, dealing with the results of field experiments carried out during the growing season of 1911.

OTHER INSECTS.

Studies of the grape berry moth, which have been in progress for several seasons, have been practically concluded and a full report on the subject is now in press. Work against the fruit-tree leaf-roller has been carried on, with headquarters at Canyon City, Colo., where the pest is especially troublesome. An experimental orchard has been planted for the study of apple-tree borers in a region where these insects are abundant. Considerable work has been done with the parasitic and predatory enemies of deciduous fruit pests. The peach bud mite and the peach Lecanium have been subject to especial study, and some careful work has been done with the most economical and effective insecticidal sprays.

CEREAL AND FORAGE-PLANT INSECT INVESTIGATIONS.

The work of the section of cereal and forage-plant insects, carried on under the immediate supervision of Prof. F. M. Webster, was enlarged in its possibilities by the appropriation of additional funds, largely owing to the urgent need for extensive work against the alfalfa weevil, and several other problems of economic importance have come up in the course of the general work of the section.

THE ALFALFA WEEVIL.

Owing to the appropriation of additional funds, the work against the alfalfa weevil has been carried on much more extensively than has been possible heretofore. Additional men have been added to the force of investigators, and the insect has been carefully followed through the entire year and through its annual life cycle. Not only has this work been carried on in the laboratory and in the fields adjoining headquarters, which are at Murray, Utah, a short distance south of Salt Lake City, but they have been duplicated to a large extent in higher altitudes, in order to obtain a thorough knowledge of the insect throughout the territory over which it has become distributed.

Much experimental work has been carried on in the fields, both with parasitic insects and with parasitic fungi. Other experiments have been conducted with reference to the treatment of the infested fields by different cultural methods, including irrigation. Still other experiments have been carried on, in cooperation with the Bureau of Plant Industry, with reference to the determination of a possible partial immunity in certain strains of alfalfa. In cooperation with the Utah experiment station, field experiments have been carried out in the way of combining alfalfa with other crops in order to reduce, if possible, the intensity of the weevil attack. There seems to be a disinclination on the part of the weevil to work in shaded places, and experiments are being carried on in growing alfalfa mixed with grains and grasses in order to determine if a mixed crop of hay can not be obtained, the value of which will be equal to that of clear alfalfa, and thus evade some part of the weevil damage.

Very good results have been obtained by the use of a modified cultivator, in which the shovels of the cultivator are displaced by steel-wire brushes, and also by attaching these brushes to a springtooth harrow.

Good results have also been obtained by flooding the infested field immediately after the removal of the first crop of hay and then, while some of the water is still standing on the field, dragging a heavy plank drag over the surface. This process has come to be known as the "mudding process."

Many other experiments have been undertaken and are being tested, but at this time it is too early to express an opinion as to their value. The State experiment station, the people, and the railways have cooperated most heartily and have greatly facilitated the work. While it has not been possible to stamp out the pest at any one point, there seems to be a good prospect that growers will be able to control the insect to the point where they can still produce profitable crops. The results of the investigation carried on down to the close of 1911 are embodied in Bulletin 112 of the Bureau of Entomology.

THE SO-CALLED GREEN BUG.

The work on the so-called green bug has been practically completed and Bulletin 110 of the Bureau of Entomology, treating of the pest, is now in press. Nothing further remains except to keep the entire southern country under continual surveillance in order that farmers may be warned of impending danger and to carry out such other investigations as may be made necessary by changing agricultural conditions or farm operations.

HESSIAN FLY INVESTIGATIONS.

The Hessian fly investigations have been continued both in the eastern and western portions of the country, and humidity experiments are being carried out in the West. This latter work will of necessity cover a number of years. The progress so far made, however, indicates that wheat grown under dry-land farming may wholly escape attack from this pest.

THE SOUTHERN CORN ROOT-WORM.

Field studies of the southern corn root-worm have been carried on at several points in the southern part of the country and our knowledge of its life history is nearly complete. It is intended to carry on a series of field experiments over a large range of country in the Southern States to determine the possibility of evading the ravages of the insect by planting corn at certain later dates than those now commonly used throughout the Southern States. A large amount of data has been accumulated to indicate that protection from the ravages of this insect may lie in this direction.

THE SOUTHERN CORN LEAF-BEETLE.

The southern corn leaf-beetle appears occasionally and destroys a great deal of corn over large local areas and it has been investigated for several years. There are two or three points of vital economic importance that are still lacking in order to make the information obtained available for the protection of the farmers' crops. The entire life history of the insect from egg to adult has been carefully worked out, but additional information with reference to its food plants is yet to be secured.

THE WESTERN CORN ROOT-WORM.

An apparently unusual and certainly unexpected outbreak of the western corn root-worm has been in progress in Tennessee. A complete life history of the insect is being worked out and additional knowledge of its habits obtained which will undoubtedly enable us to suggest thoroughly effective and practical methods of prevention under a greater variety of cultural conditions than heretofore. It is hoped that this investigation will be completed during the coming fiscal year.

THE NEW MEXICO RANGE CATERPILLAR.

The country over which the New Mexico range caterpillar is known to occur has been gone over carefully, and, owing to adverse weather, the species was not so destructive during the year as it was earlier. The indications are, however, that as soon as it recovers from the backset occasioned by adverse weather conditions it will be as destructive over a widened range of distribution as it was two years ago over a more limited area.

OTHER FIELD INSECTS.

The long-continued investigation of leafhoppers with relation to cereal and forage crops throughout the United States has been completed and a bulletin (No. 108) giving the results of this investigation is now in press. Similarly an investigation of two species of false wireworms injurious to growing grain in the extreme northwestern portion of the country has been completed and the results published. One of the corn billbugs, very destructive to corn in some portions of the country, has been studied, and entirely practical measures for preventing further injuries have been found, an account of which has been published. A thorough study of a chinch-bug outbreak west of the Mississippi River has been carried out, and the results of the investigation, including practical measures of prevention, have been published. Another completed investigation is that of the western army worm and its damage to wheat and alfalfa. The jointworm work and the white-grub investigations have been continued, and the latter have been extended over a much wider range of country, including the States of South Dakota, Wisconsin, Kansas, Indiana, Ohio, Virginia, and Pennsylvania. Wireworms, the corn leaf-aphis, the western grass-stem sawfly, the clover stem-borer, a new plant louse on alfalfa, and a leaf miner damaging the same plant, a gall midge on alfalfa, and a clover and alfalfa seed chalcis have all been studied with favorable results.

A number of other insects that each year seem to be increasing on alfalfa and other crops grown in extreme southern Texas demand attention. Some of these are entirely new in the United States, having spread northward from across the Rio Grande. One of these is the Mexican army worm; another is a new root-worm, which, however, has not yet become seriously abundant. There are also several species of thrips, as well as an undescribed mite, which attack alfalfa, and another mite attacks barley in Arizona. Upon all of these species studies have been begun.

WORK ON INSECTS AFFECTING VEGETABLE CROPS.

The work on insects injurious to vegetable crops, which includes truck crops and some of the smaller berries, and some other work which can not otherwise be classified, such as the investigation of hop insects, has been carried on under the direct supervision of Dr. F. H. Chittenden, as in previous years. Several stations, established at first in a tentative way, are now nearly under full swing, as follows: In tidewater Virginia, where general work has been done for several years; in southern Texas, where a somewhat different line of work has been carried on; in southern California; at Rockyford, Colo.; in Indiana; on Long Island, and in Maryland. The life histories and habits of quite a number of species not hitherto investigated have been nearly completed, and some insects comparatively new as pests have been studied. New insecticides, especially in combination with others, have been tested at all the stations, and some eminent successes have been achieved in demonstration.

INVESTIGATIONS IN TIDEWATER VIRGINIA.

Series of arsenical spraying tests against the Colorado potato beetle in tidewater Virginia, begun toward the end of the last fiscal year, have been continued with different strengths of arsenite of zinc in comparison with arsenate of lead and Paris green and in combination with or in comparison with Bordeaux mixture, lime-sulphur, and other sprays. The results will be available when the potato crop is dug.

While observations were being continued on the seed-corn maggot, a general pest in vegetable fields, a field comparatively free from these insects became seriously infested after the application of fish scrap or tankage. This attracted the flies, which laid their eggs, and the field was soon found alive with maggots. This fish scrap is much used in tidewater Virginia, both as a fertilizer and as an insect deterrent, but it is obvious that in this case at least its use was detrimental rather than beneficial.

Lady-beetles obtained from California were liberated in the vicinity of Norfolk and Portsmouth, Va., to the number of more than 100,000.

Experiments against Fuller's rose beetle were carried on at this station, but nothing more efficient than hand picking was found.

INVESTIGATIONS IN TEXAS.

While many of the truck-crop insects have been studied in Texas, and reports upon them will soon be available, the onion thrips, as during the previous year, was the principal project. Damage by this insect during 1911 was very considerable, but it has not been so pronounced during the first part of 1912. Clean cultivation has been practiced with favorable results, and the spraying solutions which have turned out to be the best are nicotine solutions with whale-oil soap, strong turpentine soap, lysol, and lime-sulphur. Kerosene emulsion was used to some extent, but owing to the amount of lime in the water it was difficult to secure a stable emulsion. The main object of this investigation has been to find some means of holding the thrips in check so that the plants may mature normal bulbs. Many growers have sprayed too late, not beginning until after the plants have begun to curl. After such a check in growth has gone on for several weeks spraying is practically useless, unless excessive rains occur, in which case possibly one-third of the crop will mature to a normal degree. Some of the growers have succeeded in holding the thrips in check with only two sprayings, while others have had to spray as many as seven times. It is hoped that the next season's work will result in a lessening of the number of applications needed and in the use of machines that will cover more than one row at a time. It is estimated that 25 per cent of the onion crop in Texas was lost through the work of this insect during the season of 1910–11.

INVESTIGATIONS IN SOUTHERN CALIFORNIA.

A laboratory for the study of truck insects has been maintained at Compton, Cal., and much new information has been gathered concerning the insects affecting truck crops and sugar beets. The bean thrips, among others, has been carefully studied, and its habits, life history, and control have been fully worked out. An interesting internal parasite has been found which is also parasitic on the onion thrips, the percentage of parasitism often reaching 30 to 50 per cent. It has been demonstrated that this parasite can be successfully transported elsewhere by shipping the dormant parasitic pupæ. Attempts are being made to introduce it into other sections of the United States in which the onion thrips is causing damage.

Cutworms and wireworms infesting sugar beet have been carefully studied and an investigation of the beet root-aphis has been continued.

Work on the celery leaf-tyer has been nearly completed, and it has been shown by chemical analyses of sprayed celery that there is no danger to the consumer from celery sprayed with arsenicals.

INVESTIGATIONS IN NORTHERN CALIFORNIA.

With headquarters at Sacramento, Cal., investigations were conducted upon the red spider of the hop, the hop aphis, cutworms, and the white ants attacking trellis poles.

A good means of fighting the so-called red spider has been worked out. This consists of mixing lime-sulphur with flour paste, afterwards diluting it. This mixture kills the eggs of the mites, whereas powdered sulphur did not have this effect. Two applications were necessary thoroughly to reduce the infestation.

Observations were made upon the hop aphis at Santa Rosa, with especial reference to its hibernation, and spraying experiments were carried on to determine the efficiency of various proportions of nicotine sulphate and whale-oil soap, blackleaf tobacco with whale-oil soap, and whale-oil soap alone.

WORK IN INDIANA.

Investigation of the onion thrips, which down to the present year had been largely carried on in the onion-growing regions of California and Texas, has been continued in a new locality and under somewhat different conditions. In the vicinity of Knox, Ind., where the soil is of a peaty nature and is well underlaid with sheet water, a large industry has grown up, the onion acreage in 1910 approximating 1,500 acres, while in 1911 it was practically doubled. The climatic and soil conditions obviously differ widely from those in the semiarid irrigated regions previously experimented with, and it has been found that somewhat different methods are productive of the best results in the control of the thrips. The damage during 1911 was conservatively estimated at more than $100,000, an average loss of $36 per acre. Extensive cooperation must be secured for the control of the insect in this region. Proper cultivation must be carried on at the right time, and control measures must be begun before serious injury occurs. New experiments are being made, and special adjustments in types of sprayers are being tested which will no doubt demonstrate some effective control measures.

Other investigations that have been carried on in this locality concern the life histories and control of a number of other pests at present injurious to the onion in the Indiana section. Demonstrations have been conducted in the practical application of cutworm and wireworm remedies. All other insects of interest to the truck grower have been under observation in order that appropriate remedies may be prescribed at short notice.

WORK IN COLORADO.

The most conspicuous insect outbreaks of the year at the station in Colorado were occasioned by grasshoppers and by the beet army worm. Grasshoppers occurred by millions throughout the valley, and caused extensive damage to sugar beets and truck crops. Where it was possible to stir farmers into action the hoppers were controlled. The so-called Criddle mixture, successfully used elsewhere, proved here an almost complete failure. Bran and arsenic bait and the use of hopperdozers gave excellent results, while spraying gave more satisfactory results than any other method. The sugar-beet webworm infested an area of nearly 1,000 acres of beets in the Arkansas Valley alone. More than 200 acres were successfully sprayed at Rocky Ford, and it was demonstrated that the sugar-beet webworm and the beet army worm can be readily controlled by spraying with Paris green and whale-oil soap. The unexpected discovery was made that Paris green is more satisfactory for use on beets than arsenate of lead. Much work was done at this station upon a number of garden pests, especially as to life histories.

INVESTIGATIONS ON LONG ISLAND.

Work upon the potato flea-beetle and upon various cauliflower insects was taken up at the Long Island station. Spraying experiments with arsenite of zinc, arsenate of lead, Paris green, and a combination of arsenite of zinc and atomic sulphur were made against the cabbage looper on cauliflower. It was found that it was necessary to use some sticky substance in order to make the spray adhere to the waxy leaves of the cauliflower.

WORK ON INSECTS AFFECTING CITRUS FRUITS.

The investigation of the insect enemies of citrus and other subtropical fruits has been carried on during the past year as heretofore under the direct supervision of the Assistant Entomologist, Mr. C. L. Marlatt. The leading projects have been the investigation of the orange thrips in California and the white fly in Florida, with the introduction from India of predaceous and parasitic enemies of the last-named insect. This attempt at introducing the natural enemies of the white fly has been referred to in a previous section of this report.

WORK ON THE WHITE FLY IN FLORIDA.

As indicated in the last report, the investigation of the white fly in Florida had made substantial progress and is nearing completion. The finished work included reports on life history, control by hydrocyanic-acid gas and by natural agencies, such as fungous diseases, the destruction of unnecessary food plants, and an attempt in many ways to create conditions favoring immunity from attack by the fly. There remained uncompleted the important means of control by sprays, and work during the last year has been concentrated upon these measures. Inexpensive but effective oil-soap sprays have been worked out and are now being used, and these promise to settle in a satisfactory manner the problem of direct control. There are now in preparation or in print reports covering the completed aspects of this investigation, namely, (1) control by fumigation; (2) control by natural agencies, such as fungous diseases, and (3) control by spraying. The life-history studies have already been published. There is also in preparation a report giving results of the explorations of Mr. Woglum, the expert who was sent to India, including an account of the discovery of the native home and probable original range of the white fly in Asia and the facts found by Mr. Woglum in relation to control by parasites in India and the methods devised for collecting and introducing the natural enemies.

THE ORANGE THRIPS.

The investigation of the orange thrips at Lindsay, Cal., has been continued during the past year along the lines indicated in the last report, and the demonstrational results of the spraying tests have been satisfactory and have resulted in their general adoption by the growers.

For the season of 1912, already begun, there is under way further demonstration spraying of orchards with lime-sulphur at the strength which past work has shown to be most advisable, namely, a stock solution of 36° Baumé diluted for application to the trees with 56 parts of water.

In connection with the thrips work at Lindsay, a number of other troublesome pests of the orange have been investigated, particularly a green katydid and certain leaf-feeding larvæ. Against this class of insects tests have been conducted with arsenicals in combination with the lime-sulphur demonstration for the orange thrips just referred to. The work against the orange thrips in this region and the particular leaf-feeding insects mentioned should be completed with this year's work, and a final report prepared for publication.

INVESTIGATIONS OF INSECTS IN THEIR DIRECT RELATION TO THE HEALTH OF MAN AND DOMESTIC ANIMALS.

THE HOUSE FLY AND THE MALARIAL MOSQUITO.

Some additional experiments have been carried on with regard to the destruction of the disease-bearing house fly, and every effort has been made to stimulate the popular crusade against this insect which has been spreading over the country, and to assist in every possible way those engaged in remedial movements in different cities and elsewhere. The work of the bureau has been a prime factor in the spread of knowledge concerning the carriage of disease by the house fly and of the best measures for its control.

In the same way, by correspondence, by the distribution of printed information, and by further studies, the encouragement of work against the malarial mosquitoes of the genus Anopheles has been fostered during the year as during the previous year. Antimosquito work has been undertaken in many places for the purpose of relieving the annoyance caused by the presence of mosquitoes. It is hoped, however, that movements directed mainly against malaria may be increased in number in this country. It is a strange fact that in other countries antimosquito work has been carried on practically entirely with the idea of reducing the mortality from malaria and the incapacitation of labor from the effects of this disease, while in this country, with the exception of the work done upon Staten Island, all measures against mosquitoes have been inaugurated against them simply as nuisances and as operating to reduce the value of real estate, and not primarily as a means of lessening disease.

WORK ON TICKS.

The tick work done by the bureau has been under the direct supervision of Mr. W. D. Hunter, and includes studies of and experiments with all ticks concerned in the carriage of diseases of animals and man. The investigation of the Rocky Mountain spotted fever tick in the Northwest, referred to in the last report, was carried to the point where it was possible to outline a means of eradication that is both practical and economical. By this plan, resulting from life-history studies, it has become possible to organize a campaign for the total eradication of this important pest at a cost of about $25,000. The details of this plan have been elaborated in a bulletin published by the bureau. Arrangements had been made to continue observations on a small scale to show the longevity of the ticks under different conditions, but the work has been discontinued for the reason that the United States Public Health and Marine-Hospital Service, at the request of the State health authorities of Montana, decided to take up the problem, which more logically belongs to that service than to the Department of Agriculture. In its work the bureau carried on its investigations in cooperation with the State Agricultural Experiment Station of Montana and with the Bureau of Biological Survey of the United States Department of Agriculture.

With the practical completion of the work on the spotted-fever tick, it became possible to devote some attention to other species of considerable economic importance, upon which only general observations had been made. Work was begun on the fowl tick, which is a serious pest in a large area of the southwestern portion of the United States. At the same time the spinose ear tick was taken up. This creature is the cause of the loss of a large number of calves in Texas, New Mexico, and Arizona.

The work on the accumulation of data regarding the life history of the species which transmits splenetic fever of cattle was continued. This consisted largely of experiments to determine the longevity of the different stages of the tick under different environments. This work has been of great practical value in connection with the eradication of the cattle-fever tick in the United States, and it has progressed to the point where it will soon be possible to issue a bulletin on the points in the life history of the species, which must be taken into consideration in the work of eradication that is now under way.

Studies on the life history of a number of species of minor importance were completed and the results placed in the form of a publication. Incidentally observations were made upon several other pests of live stock, including the horn fly and the screw-worm, which will lead to the formation of plans for better control of these species in the future.

INVESTIGATION OF POSSIBLE TRANSMISSION OF PELLAGRA BY INSECTS.

Attention was called in the last report to the announcement by Dr. Sambon that in Europe a species of Simulium is the probable agent in the transmission of pellagra. During the fiscal year, at the request of the State board of health of South Carolina, two agents of the bureau were sent to that State to investigate the subject. They had been occupied in determining the distribution of sand flies with reference to the locality in which pellagra is known to have originated. For various reasons the theory proposed by Dr. Sambon is of doubtful validity. Nevertheless there seem to be indications that the disease may possibly be transmitted by certain insects if not by sand flies. For this reason the investigations of the bureau have dealt with a number of species of biting insects which are to be found commonly in localities where pellagra occurs. Much material was collected, but down to the present time there are no definite indications that pellagra is an insect-borne disease. It is, however, necessary to do much more work before any reliable conclusions can be reached.

WORK ON INSECTS INJURIOUS TO STORED PRODUCTS.

Work on insects injurious to stored products has been performed, as previously, under the immediate direction of Dr. F. H. Chittenden. Many practical tests have been made of the value of bisulphid of carbon and hydrocyanic-acid gas.

Of especial interest was the work on the fig moth conducted last year and published in November, 1912. Investigations of the life history, habits, and control of this species in California have been continued.

Some important experiments have been carried on with carbon tetrachlorid as a substitute for carbon bisulphid in fumigating for insects. It has been shown, after numerous experiments under different conditions, that this substance can not be economically applied on a large scale, but may be used to advantage for choice seeds and in office rooms and dwellings. Where rooms can be made air-tight and where the use of inflammable materials like carbon bisulphid are prohibited or are undesirable, this substance could be used very generally, since it is not dangerous to man in any way. Its expense, however, is such as to prevent its very general use. It would, in fact, be an ideal fumigant under these conditions were it not that it costs three times as much as bisulphid of carbon.

The broad-bean weevil has become established in California and in the East, and is spreading. Its distribution in the United States and abroad and its supposedly poisonous nature have been investigated, and germination tests of infested seeds have been made and much experimental work has been done with remedies. It seems that there is a possibility of the eradication of the species by cooperation in California or by special legislation, by insisting on the practice of holding seeds over for two years and by the fumigation of all beans arriving on the Atlantic coast.

Investigations have been conducted on other species affecting beans, peas, and cowpeas and similar seeds in storage. Some of these are new, some have been introduced, and some are native to the United States.

Experiments have been carried on in the fumigation of rice mills. Some firms use with success a combination of sulphur and lime. The use of naphthaline as a preventive and of some adhesive substance which will kill insects in the floors and then dry have been continued.

INSPECTION WORK.

As previously indicated, the principal inspection work done by this bureau relates to the examination of the seeds, plants, and fruits imported by the Department of Agriculture, and of commercial importations consigned to dealers in Washington direct or in bond. No less than 1,039 lots of seeds and plants imported by this department have been carefully inspected—sometimes twice, once on receipt by the department and again before distribution. Many of these lots have been held in quarantine, and to safeguard against the introduction of dangerous insects a number of them have been destroyed. The bureau was advised of some 60 commercial importations during the year, and these were inspected. There was also a shipment of about 3,000 ornamental flowering cherry trees, sent as a gift to this city from the city of Tokyo. These trees were examined individually with great care and were found to be in perfectly healthy condition as regards insect attack.

It has been necessary also, as in the past, to inspect all local living plant stock shipped from the District, inasmuch as there is no other means for such inspection, and the laws of surrounding States require inspection and certificate as a condition of entry.

Many of the foreign insect pests detected by such inspection are already established in this country, but their discovery on these new importations illustrates well the probability of their original entry. Many others have been insect pests new to this country. Among the latter are a number of scale insects from China, which, if allowed to escape and to become established, might be just as destructive as the notorious San Jose scale, which is also of Chinese origin. Some plants from Italy brought another scale insect unknown in this country, but which in Italy is a distinct pest. Walnut scions from Tientsin, China, were found to contain the eggs of an insect just ready to hatch. This insect is the one referred to as having been found on cuttings from China last year, and, judging from our knowledge of allied insects, would probably be a serious tree pest if established. A new mango-seed weevil was found infesting mango seeds from India, and another weevil was found infesting the seeds of the avocado. Other imported mango seeds were found to be infested with a new lepidopterous borer, and the common mango weevil referred to in last year's report was also frequently found in imported mango seeds. Imported date palms from Egypt were practically always infested with the two important date scales which, unfortunately, have already gained a foothold in most of the date orchards in this country. The greatest care should be taken, however, to prevent entry of these scales into new date plantations which may be established.

THE PRESENT STATUS OF THE PROPOSED PLANT-QUARANTINE LAW.

The effort to secure an adequate plant-quarantine law to protect this country from the entry of new insect pests or plant diseases with imported nursery stock or other living plant material has been referred to somewhat at length in previous annual reports. The new bill referred to in the report for last year was introduced at the extra session of the present Congress, but there was no opportunity to advance it at that session.

In December, 1911, this measure was carefully considered by a well-attended meeting in Washington, at which many of the States were represented through their State or experiment-station entomologists, horticultural inspectors, or other horticultural officers. The meeting was also attended by representatives of the nurserymen. An agreement as to certain modifications of the measure was reached, which resulted in the approval of the measure by the nurserymen who had before opposed it on the ground that it might be prejudicial to their importing interests. The bill as thus modified was introduced at the present session of Congress and given a hearing before the agricultural committee of the House. As a result of this hearing the bill was still further modified, and these modifications were accepted by nurserymen and seedsmen and approved by this department and the State officials concerned. The bill thus revised (H. R. 24119; Rept. 660) was unanimously reported from the Committee on Agriculture and is now awaiting its turn for attention in the House.[1]

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[1] Since the above was written an act "to regulate the importation of nursery stock and other plants and plant products; to enable the Secretary of Agriculture to establish and maintain quarantine districts for plant diseases and insect pests; to permit and regulate the movement of fruits, plants, and vegetables therefrom, and for other purposes," was approved August 20, 1912.

In general, the Federal powers granted in this bill relate to the establishment, when desirable, of foreign and domestic quarantine; the issuance of permits for importations; the requirement of foreign certification as to freedom from disease or insect infestation; and the distribution to the several State officials by the Department of Agriculture of exact information in regard to origin and arrival and destination of all importations. To the inspectors of the several States is left the responsibility for inspection and disinfection of imported stock and the cleaning up and disinfection of local quarantined districts.

Under this bill as much protection can be had as would come from any legislation providing for inspection at point of destination. It will enable quarantine to be declared against such immediate dangers as the Mediterranean fruit-fly, the potato-wart disease, and the white-pine blister rust. The last two dangers were referred to in some detail in my last annual report. The Mediterranean fruit-fly is a new risk and a most serious one. This insect, which has a long record of excessive damage to all sorts of fruits and vegetables in a good many foreign countries, has recently become established in the Hawaiian Islands and unless quarantined against is certain to be brought in from those islands or from other quarters of the world where it has gained a foothold. It is, perhaps, a more serious fruit pest than any now occurring on this continent. Its larvæ, or maggots, infest all sorts of fruits and many vegetables, and the presence of these in fruit can not be determined except by cutting the fruit open, unless the destruction has gone to such a stage that putrefaction has set in. Its introduction would be most disastrous to the citrus and deciduous fruit interests of the southern Pacific coast and throughout our Southern States. It is a grave danger not only to all subtropical fruits and vegetables, but to peaches and melons and other similar crops now grown most profitably over a large section of the South.

The imminence of this danger has already led Congress to make an appropriation of $35,000 to be expended in an attempt to control this fly in the Hawaiian Islands, and thus limit to some extent the likelihood of its reaching the United States through California. Its extermination in the Hawaiian Islands is recognized as absolutely out of the question, and the only effective safeguard is a quarantine which will exclude fruits or vegetables likely to carry the insect.

The need, therefore, of a Federal plant-quarantine law is much greater than ever, and delay in securing it may result in enormous and continuing damage to the fruit interests of this country.

In the absence of this legislation this bureau has proceeded along the lines reported in previous years, securing as complete records as possible by voluntary cooperation of railroads and customs officials of imported plant stock and transmitting the information relating to arrival and destination of the imported stock to the proper State officials with the hope that the latter would inspect and safeguard the entry of such goods. As previously pointed out, there is no assurance that the records thus obtained are complete, and there is very great probability that injurious pests which we know are coming in may gain foothold at any time. Importation of cheap and often refuse stock by department and 5-and-10-cent stores has continued, and much of this stock is not inspected at all, or, if inspected, given scant attention.

As the United States is practically the only important country in the world without a rigid inspection and quarantine law, it naturally becomes the recipient of goods of such quality or infestation as can not find a market elsewhere. A notable illustration of this is seen in the potato crop of Newfoundland, which is now known to be more or less infested with the potato-wart disease. Canada has quarantined strictly against Newfoundland's potato crop, which practically diverts this crop to the United States. As an interesting result, Canada has recently amended her quarantine act to include the potato crop of the United States, on account of our receiving, without examination, potatoes from Newfoundland and the consequent risk to Canada of receiving some of these potatoes again from the United States or potatoes infested from this source. The short crop of potatoes of last year had also the unfortunate result of vastly increasing the quantity of potatoes brought in from abroad, and some of this imported stock came from infested districts in Europe. All of it, therefore, is under suspicion. A circular of warning has been issued by the Bureau of Plant Industry in relation to these imported potatoes, urging the farmers not to use such stock for seed, but such warnings will necessarily fail to reach many, and imported diseased potatoes may very probably have been planted. Every year's delay, therefore, adds enormously to the risk we are running, and prompt action by Congress can not be too strongly urged.

WORK IN BEE CULTURE.

The increased appropriation for apicultural investigations has made it possible substantially to increase the work in this direction during the past fiscal year. It has been carried on, as before, under the direction of Dr. E. F. Phillips. The poor season of 1911 and the severe winter of 1911–12 have served greatly to discourage the bee keepers of the country, and the losses have been enormous. In spite of this discouraging combination of circumstances, however, the interest in the industry seems constantly to increase, and there is a steady and encouraging growth in interest in the work of the bureau on this subject.

BEE DISEASES.

The work on the etiology of the brood diseases of bees has been continued, and during the fiscal year the cause of European foul brood has been determined for the first time. This disease, which causes such heavy losses in various parts of the country, is caused by *Bacillus pluton*, an organism discovered and named by Dr. G. F. White, of this bureau. Dr. White now has the credit of having determined the causes of the two serious infectious diseases of the brood—American foul brood and European foul brood. The more recent work is described in Circular No. 157 of this bureau.

The paper summarizing the most important publications on the etiology of bee diseases, which was mentioned in the last annual report, has been issued as Bulletin No. 98. This bulletin should be of great value in aiding investigators and practical bee keepers to judge more accurately the reported results of work on this subject and in clearing up the confusion which has been so widespread among students of bee diseases.

The work on the diseases of adult bees has been instituted, especially in a study of the parasite *Nosema apis*. Information has been obtained concerning its prevalence and distribution. This organism is the one which certain European investigators have studied and which is reported by them to be the cause of certain serious diseases of adult bees. A field study of the condition known as bee paralysis was made early in the spring in apiaries in Florida, where this is reported as causing considerable losses.

The work on the geographical distribution of the two brood diseases—American foul brood and European foul brood—has been continued, and during the fiscal year 1911–12 959 samples were examined, as against 1,054 for the year 1910–11. After the publication of Circular No. 138, giving data up to March 1, 1911, there were received during the season of 1911 samples showing the existence of American foul brood in 116 additional counties and European foul brood in 71 additional counties. At the close of the season of 1911, therefore, the records showed American foul brood in 410 counties in 39 States and European foul brood in 236 counties in 25 States. The work is to be continued during the summer of 1912. So far special attention has been given to the Eastern and Northern States, since the infectious diseases are most abundant there, but in view of the fact that numerous isolated outbreaks are present in other parts of the United States, an attempt is now being made to locate these. Such information will be especially valuable to bee keepers in such States who are interested in urging the passage of laws providing for inspection of apiaries, so that the diseases may be brought under control and the bee keepers educated in their treatment before the situation becomes so bad as that in the older infected areas.

The data obtained in the study of the distribution of the brood diseases have been extensively utilized during the year in an educational campaign. Warning cards were prepared and sent to about 60,000 bee keepers whose names were obtained in counties where disease was known to exist. At the same time press notices were sent out to the weekly newspapers in the same territory, calling attention to the existence of disease and suggesting methods of getting information on the subject. Somewhat similar notices were sent to the agricultural papers. One of the most important features of this work was the insertion of information on brood diseases in the catalogues of various dealers in bee keepers' supplies. This was done at the suggestion of this bureau, and in several cases copy was supplied, as well as cuts illustrating the two diseases. In all, probably nearly a million catalogues were circulated among the bee keepers of the country, calling their attention to the existing conditions and giving directions for obtaining further information and help. The results of these undertakings are being shown clearly in the greatly increased number of special inquiries, requests for bulletins, and samples of suspected brood sent for examination.

A special inquiry into the methods and results of apiary inspection and the cost in various States has brought out some interesting data, which will be incorporated in a bulletin to be issued in connection with the data on the distribution of the brood diseases. The information obtainable is sufficient to indicate a marked benefit from apiary inspection and fully justifies the efforts of this bureau and other agencies to perfect the inspection service. It is conclusively shown that the placing of the apiary inspection under an already existing office, such as that of the State entomologist, leads to economy and greater efficiency. The actual cost per colony varies greatly, due in part to differences in facilities for travel and the state of the bee-keeping industry, but it is clear that a methodical covering of the territory is the greatest factor in successful work. Special attention has been paid to methods of keeping inspection records.

Special assistance has been given the inspectors in New Jersey, Pennsylvania, and Colorado. A 10-day trip through Colorado was taken with the deputy State inspector for the purpose of studying the disease situation in that State.

An important step in the fight against these diseases was the organization of the Association of Apiary Inspectors of the United States and Canada in December, 1911, in Washington, at the call of Dr. E. F. Phillips, of this bureau. The object of this organization is to bring about improvement and uniformity in legislation, inspection, and records. While this is not a bureau movement, it will serve as a valuable adjunct to its activities in these respects. A meeting of the apiary inspectors of the northeastern United States was held at Amherst, Mass., in February, at which Dr. Phillips represented the bureau.

As in the past, information concerning the presence of disease is at once sent to the authorized inspectors of apiaries. Wherever possible, bulletins on the treatment of disease are sent to all known beekeepers in territory found to be infected, and in every way possible an effort is made to help the bee keepers to an understanding of the difficulty.

During the year, at the request of some western bee keepers, a revised regulation was issued by the Post Office Department concerning the mailing of queen bees. This step was taken to prevent the spread of brood diseases through the mailing of queens from infected apiaries. As issued, this would have served practically to destroy the business of queen rearing, and consequently the department recommended a further revision, which was adopted and signed May 3, 1912. As it now stands it meets with the approval of the leading bee keepers of the country and should serve to retard the spread of disease. Too much should not be expected of this precautionary measure, however, as there are still other avenues open for the spread of infectious diseases.

THE DEVELOPMENT OF THE BEE.

The work on the development of the bee, which has been carried on for some time, has been completed, and the results are being incorporated in a manuscript to be presented for publication in the immediate future. The work so far done included the development in the egg up to the time the young larva hatches, and will now be continued to include the anatomy of the larva. This work has been done by Dr. James A. Nelson.

BEHAVIOR OF THE BEE.

As a foundation for work on the behavior of the honey bee, a study of the structure of the sense organs is being made. The results so far indicate a wider distribution of such organs than was previously known and will form a basis for experimental work on the functions of the organs, now under way. Some preliminary experiments were conducted during the summer of 1911. This work is being done by Dr. N. E. McIndoo.

The behavior of bees in wax secretion and comb building has received special attention, and the results indicate that bee keepers and entomologists have entertained erroneous ideas concerning this phase of bee activity. In connection with the uses of the various parts of the legs a study was made of the methods of packing pollen. This work was carried on by Dr. D. B. Casteel and is to be continued during the summer of 1912.

THE PRODUCTION OF COMB HONEY.

Considerable attention has been given to the methods of producing and marketing comb honey and the circumstances under which comb-honey production is most profitable. Special attention has been given to the problem of swarm prevention and control, since this is especially difficult under comb-honey conditions. The methods of some of the leading comb-honey experts of the country have been studied. The results of this work are incorporated in Farmers' Bulletin No. 503, by George S. Demuth.

WINTERING.

The winter of 1911–12 was one of the worst on record in the loss of bees, and this has made it necessary and desirable to begin work on the methods of wintering bees. A study of bees in cellars just before their removal was made in New York, and special attention was given to moisture and temperature of the cellars and the stores provided the preceding autumn. This work will be continued.

UNCLASSIFIED WORK.

As always happens, much work has been done in the chief branches of the bureau which can not be classified. Investigations of nut insects and insects injurious to ornamental plants and shade trees have been continued. Correspondence on the subject of shade-tree insects has been very great. There has also been a tremendous interest in the subject of household insects, and many hundreds of inquiries have been received.

The unnoted and at the same time laborious and necessary work of determining specimens for the entomologists of the different agricultural experiment stations, of the agricultural colleges, and others, has been continued and has occupied more or less of the time of a number of the expert investigators connected with the bureau and stationed at Washington. During the fiscal year nearly 35,000 specimens were determined for outside persons.

There have not been so many publications issued during the year as during the previous fiscal year, partly owing to deficient funds.

Fifty-five separate numbers, however, have been published and distributed, and the number of printed pages of information contained in these publications has been much greater than that shown by the 75 numbers published the previous year, while the number of pages of proof read in the bureau has been practically double that for the fiscal year 1911.

PROPOSED WORK FOR THE FISCAL YEAR 1913.

With regard to the gipsy moth and the brown-tail moth, it is proposed during the coming year to clean such additional roadsides as may seem most necessary, but to give more particular attention to drawing in the infested border line by exterminating the moths in the outside towns, especially on the southwest and north, which are the lines of least resistance. There seems to be less hope of control on the northeast edge on account of the wind spread; that is to say, the destribution of the newly hatched caterpillars by the wind. When the wind blows from the west the larvæ go out to sea, and when it comes from the north or east it is usually so cool that there is little activity among the young caterpillars; but the south and southwest breezes are warm, the little larvæ are active, and spread occurs when they are spinning from the tree tops. Cooperative work with the other States, and inspection of forest products, such as lumber, cordwood, posts, poles, Christmas trees, and evergreen decorations, must be continued with the greatest vigilance. There is danger in the shipment of Christmas trees from the infested areas to Philadelphia, Chicago, and other cities, and inspection of this class of shipments is most difficult. Field work will be continued in the effort to determine the increase of the species in different selected localities. Observations on feeding habits will be followed up, and the laboratory experiments on food plants already begun will be continued. If sufficient data are obtained, cooperative work with owners of badly infested wood lots will be attempted in the effort to prevent further damage from the gipsy moth. Importation of such useful parasites as can be secured will be continued, probably on a smaller scale, and the study of the dispersion and increase of those already colonized will be continued.

The work on the boll weevil has been interfered with greatly by the floods in the Mississippi Valley, but so far as possible experiments with new forms of practical control will be conducted. Opportunities for the poisoning and square-gathering experiments have been found outside the flooded area. In addition to the work on the introduction of parasites, the determination of the status of the insect from time to time and the extent of its spread into new territory will be followed up.

In the work on tobacco insects, demonstrations of the means of control that have been perfected will be conducted on as large a scale as possible. The so-called mosaic disease, now known to be caused by insects, and the cigarette beetle will receive special attention.

The sugar-cane borer will be studied with especial reference to its possible connection with the so-called root-rot disease of sugar cane, and large experiments in the control of the Argentine ant at Hattiesburg, Miss., will be continued throughout the season, and especial attention will be given to the possibility of preventing the infestation of Florida orange groves by this pest. Experimental work against the rice water-weevil will be continued, and the work against the cotton red spider in South Carolina will be largely of a demonstrational character.

The work on the possible influence of insects in the carriage of pellagra will be continued in cooperation with the Public Health and Marine-Hospital Service and with the recently established pellagra commission of the New York Postgraduate School of Medicine.

With forest insects, especial attention will be paid to the subject of insects affecting chestnut and the chinquapin, and a detailed study of the relation of insects to the blight and other diseases affecting these trees. The damage by insects to the seeds of forest trees will be studied, and investigations of the reductions in value of living, fire-killed, insect-killed, and storm-felled timber caused by wood-boring insects will be carried on. Special studies of the more important groups of forest-tree insects will be made, and experiments will be carried on with different chemical wood preservatives as to their effect in preventing attack of wood-destroying insects, especially white ants or termites. The investigation of insect damage to telephone and telegraph poles, mine props, and posts and timbers used in railroads or other constructions will be continued, as well as the practical demonstration work on methods of locating and treating timber infested with Dendroctonus and other tree-killing insects. So much of the latter work has been done that it is believed that less of the educational work will be needed the coming year.

With insects affecting deciduous fruit trees, most of the investigations of the past year will be continued, especially those relating to the grape Phylloxera, the apple-tree borers, the pear thrips, the peach Lecanium, and the codling moth. It is hoped to conclude the work with grape insects in the Lake Erie Valley and to utilize the force there in other investigations. The completion of the codling-moth studies in Michigan and California renders it possible to attempt some other investigations in those States, and in California, specifically, inquiry with regard to currant and gooseberry insects will be started.

With regard to cereal and forage insects, the same problems will continue under investigation, and with the added funds appropriated it will be possible to concentrate with greater force upon the important problem of the alfalfa weevil.

Added funds for the investigation of insects affecting vegetable crops have been specifically designated for the purpose of increasing the facilities in the study of insects affecting sugar beets, and also for added work upon the onion thrips. The stations already established will be continued, and the general outline of the work given in earlier paragraphs in this report will be followed out.

In the case of citrus fruits and subtropical fruits in general the work at Lindsay, Cal., relating to the orange thrips and various leaf-feeding insects should be completed with this year's work, the thrips project having already reached the demonstrational stage. The white-fly work in Florida has also reached a substantial conclusion. It seems wise, however, to carry out a series of demonstrations in different sections of the State to show the effectiveness of a proper system of spraying kept up for a period of two years. This demonstration work has already been begun, and will be just the kind of an object lesson which will impress growers and will lead to the general adoption of an adequate system of direct control. A further effort may very properly be made to reintroduce the natural enemies and parasites of the white fly, discovered by Mr. Woglum in India, but it does not seem wise to do this under the present appropriation. The investigation of the use of hydrocyanic-acid gas in fumigating citrus trees in California terminated at the close of the fiscal year 1909–10, and a very satisfactory report was issued. The recommendations in this report have been generally adopted in southern California, but certain new problems have arisen owing to variations in results under different conditions, and there has been much demand during the two years intervening for a continuation and further rounding out of this investigation. This is gratifying as indicative of a keen interest in the subject and as an expression of approval of the value of the investigation already completed. It is therefore planned that this work be resumed, and that other special and related insect problems in southern California be taken up incidentally.

One of the most important problems of the year is the investigation of the Mediterranean fruit-fly, long recognized as one of the worst fruit pests in Australia, South Africa, and other countries where it has become established, and which has been found in the Hawaiian Islands and bids fair to be introduced into California. The imminence of the danger has led to an especial appropriation to be expended during the year and particularly for an attempt to control the fly in the Hawaiian Islands, thus limiting the danger of introduction into California. The territorial government of Hawaii has already made an appropriation, and is engaged in active work in cooperation with agents from the State of California paid by the State. It is planned to put an expert of the Bureau of Entomology in charge of the work and to prosecute as vigorously as may be all possible measures of control.

In bee culture the problem of successful wintering will be the next one to be attacked by the bureau. Preliminary work will be done during the coming fiscal year in this direction. The work upon bee diseases and the other lines of investigation indicated will be continued.

In the absence of a national quarantine and inspection law, such inspection work as can be carried on must necessarily be along the same lines as heretofore. Where such inspection can be determined to be of service in preventing the introduction of the gipsy moth and brown-tail moth direct from Europe into new points in New York, the expense of this service can probably be provided for under the appropriation for preventing spread of moths, but all further expense must necessarily be defrayed by individual States. The bureau will act as a general notifier and consulting agent, but beyond this its powers are limited.[1]

PLANS FOR WORK RECOMMENDED FOR THE YEAR ENDING JUNE 30, 1914.

I beg to recommend that you consider the desirability of estimating for an addition of $37,500 to the sum appropriated for the fiscal year 1913 in your estimates for 1914. It is suggested that this sum can be expended to great advantage in the following manner: $5,000 to be added to the cotton boll weevil investigations; $10,000 to the investigations of the Argentine ant in an attempt to prevent the further spread of this destructive species; $5,000 to the investigations of forest insects; $10,000 to the investigations of deciduous fruit insects; $5,000 to the investigations of insects affecting vegetable and truck crops, and $2,500 to the apicultural investigations.

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[1] See footnote, page 649.

I beg to recommend further that the offices of executive assistant and chief clerk be combined, as in the Weather Bureau, so as to read in the appropriation act "One chief clerk and executive assistant," and I further recommend that the compensation of this official be increased to $2,500, and that in place of "one chief clerk, $1,800; one clerk, class 4," the act should be altered to read "two clerks, class 4."

It is further recommended that the salary of the chief of the bureau be increased to $5,000.

REPORT OF THE CHIEF OF THE BUREAU OF BIOLOGICAL SURVEY.

U. S. Department of Agriculture,
Bureau of Biological Survey,
Washington, D. C., August 24, 1912.

Sir: I have the honor to submit herewith a report on the work of the Biological Survey for the fiscal year ending June 30, 1912, with an outline of the work for 1913.

Respectfully,
Henry W. Henshaw,
Chief, Biological Survey.

Hon. James Wilson,
Secretary of Agriculture.

WORK OF THE BIOLOGICAL SURVEY.

During the year the work of the Bureau of Biological Survey as usual was conducted along three lines: (1) Investigations of the food habits of North American birds and mammals in relation to agriculture; (2) biological investigations with special reference to the geographic distribution of native animals and plants; (3) supervision of national bird and mammal reservations, the preservation of our wild game, and the enforcement of the Lacey Act.

REARING OF FUR BEARERS.

The rearing of fur-bearing animals for their pelts continues to be a subject of much interest, and during the year many inquiries were received from various parts of the United States asking for publications on the subject and for information as to where to obtain breeding stock. In Prince Edward Island the breeding of black foxes appears to have passed the experimental stage and to have been established on a permanent commercial basis. The great demand for breeding animals and the reluctance with which successful breeders part with their stock, however, have caused very large prices to be placed on mature animals in the best pelage, and it is stated that as much as $8,000 has been paid for a pair of adult animals for breeding purposes. It is evident that as long as stock is held at such figures the business, even if remunerative, can not become general, but must remain in the hands of a very few. There are extensive regions in the United States, especially along our northern border and in Alaska, well adapted to fox farming and kindred industries, and wherever stock is obtainable at reasonable figures it is believed that the business can be made profitable.

BELGIAN HARE RAISING.

A furor for raising Belgian hares swept over the United States about 15 years ago and ceased almost as rapidly as it began, partly, no doubt, because it passed into a fad for raising fancy stock for exhibition purposes. Here and there, however, the business has persisted, and during the past year, partly, perhaps, as a result of the high price of meat, there have been numerous signs of awakening interest in the subject. The Belgian hare is prolific, easily raised, is little subject to disease when properly cared for, and its flesh is nutritious and of excellent flavor. There would thus seem to be no good reason why farmers and others having the necessary facilities should not engage in the occupation, both for the purpose of providing meat for home consumption and also for market. At 20 cents per pound, which the meat readily commands, there should be a safe margin of profit. With a view to answering the many letters of inquiry received by the Department in relation to methods of rearing Belgian hares, a circular letter was issued containing the essential facts in relation to the raising of these and other domesticated rabbits.

COOPERATIVE EXPERIMENTS WITH THE NATIONAL ZOOLOGICAL PARK IN MINK BREEDING.

First-quality mink skins at present market for from $3 to $8, according to size and condition. At these prices, which are not likely to diminish, the raising of these animals should be remunerative, especially in connection with some other established business, as farming, raising poultry, orcharding, etc. Comparatively few attempts to raise mink have been made in the United States, and at present little is known on the subject. Hence, in cooperation with the National Zoological Park, the initial steps have been taken in experimenting with these animals, with a view to determining the best kinds of pens, methods of feeding, and rearing. Later it is intended to embody the results of the experiments in a bulletin for the information of the public. Meantime, in response to the many requests for information relative to these animals, a short circular letter is being sent out, containing valuable hints on the subject of mink breeding.

PRAIRIE DOGS.

This is one of our largest and most destructive rodents, the daily forage consumed by 32 adults equaling the amount required by a sheep, while approximately 250 prairie dogs eat in a day about the same amount of forage as a cow. As the region infested by these pests includes a number of Rocky Mountain States and as some of the colonies occupy many thousand acres and aggregate millions of rodents, the extent of the damage they do both to forage and other farm crops can be readily comprehended. During the summer of 1911 preliminary experiments for the control of prairie dogs in cooperation with the Forest Service were made in the Pike and Cochetopa Forests of Colorado and Coconino Forest of Arizona. In April, 1912, the work was resumed, the chief reliance being placed on use of poisoned grain, by which a majority of a colony are killed while feeding outside the burrows. As, however, in every colony there are a certain number which for one reason or another escape it is necessary, after poisoning operations, to treat with carbon bisulphid or pintsch oil the burrows still occupied. The efficiency of these two agents is about equal, but our experiments have shown that when pintsch oil is obtainable it is probably the cheaper of the two agents. It is worth noting that early in the spring snow can be employed effectively to stop up the burrows during the bisulphid or pintsch oil operations. These experiments have demonstrated also that oats are the best vehicle for carrying poison, as they are readily eaten by prairie dogs and are rarely eaten by birds.

THE CALIFORNIA GROUND SQUIRREL.

Smaller than the prairie dog, this rodent ranges over much of California, and thrives equally in mountain, foothill, and valley. It is a voracious feeder; and as its aggregate numbers are enormous, its capacity for destroying forage and crops is almost unlimited. While the complete extermination of the animal within the State may be long deferred by reason of the cost, a very material reduction of its numbers, at least in cultivated districts, can be effected at an expense which would be justifiable on purely economic grounds. The fact that this animal has been infected with plague by fleas from rats and that this dread disease is hence likely to become endemic in California furnishes a vastly more important reason for the destruction and one that bears directly on national health problems. Under the present State law requiring citizens to clear their holdings of squirrels, and through cooperation with the Public Health Service, much has been effected by State authorities, but the public domain within the National Forests remains practically untouched. A small fund having been made available, the Survey will begin the work of reducing the number of these rodents within the California National Forests. Meantime, during the past year experiments have been conducted with poisoned baits, so that it is believed a maximum amount of good can be accomplished with the funds placed at the disposal of the Survey at a minimum of cost.

GOPHERS.

Though comparatively small, the several species of gophers are difficult to destroy, owing to the fact that they live almost entirely underground. Numerous experiments have shown that these animals are not difficult to trap, but when employed on a large scale this method, though effective, is attended with considerable expense. Hitherto it has been found difficult to poison pocket gophers; but during the past winter many poisoning experiments were carried on with very promising results in California, where the animals are particularly destructive in truck farms and orchards. In many localities these animals were almost exterminated over considerable areas by the use of sweet potatoes covered with the strychnine-starch solution which has proved so effective in destroying prairie dogs.

RODENTS IN CONNECTION WITH REFORESTATION.

The destruction of small rodents like mice, gophers, and ground squirrels in and near tracts which are to be reforested proves to be a necessary corollary to this important work of the Forest Service, as otherwise the seeds are dug up and eaten or carried away almost as soon as planted. Under these circumstances the cost of reforestation is almost prohibitive of the work. Numerous experiments were tried during the year for the purpose of determining by what means and at what time of year the destruction of these mischievous rodents can best and most cheaply be effected. It was found that in the fall, when green feed (especially berries) is abundant, the putting out of poisoned bait avails little, as it is either untouched or is carried away and "cached" for later consumption. Hence, even when the actual planting is planned for fall, the destruction of rodents to be effective must be done in spring or early summer. Several poisoning experiments were carried on in the Cochetopa Forest to demonstrate the practicability of destroying the seed-eating rodents over tracts selected for reforestation. Four widely separated areas were successfully treated, so that a good stand of Douglas fir, lodgepole pine, and yellow pine was secured. Three baits were used: (1) Cracklings treated with powdered strychnine, (2) wheat coated with tallow and strychnine, and (3) oats treated with starch and strychnine. The tallow-coated grain was found effective when the baits were exposed to rain, while the starch-coated and cracklings preparations were effective when placed under logs and other protected places. Similar experiments were carried on also in the Cabinet and Lo Lo Forests of Montana.

RELATION OF NATIVE MAMMALS TO SPOTTED FEVER.

For the past two years investigations have been made by the Biological Survey in cooperation with the Bureau of Entomology and the agricultural experiment station of Montana with a view to ascertaining the particular species of wild mammals which act as hosts of the ticks that are believed to be directly responsible for the transmission of spotted fever. Among other important facts brought out by the investigations, it has been definitely ascertained that the fever ticks in the two younger stages live almost wholly on small native rodents. As the same rodents are responsible for extensive damage to crops in Montana and elsewhere, there are thus two important reasons for attempting their extermination, at least in the near vicinity of ranches. Here the ticks are readily transmitted to domestic animals, upon which they pass the later stages of their existence, when they are capable of transmitting the fever to human beings. A bulletin has been prepared, therefore, and distributed largely in Montana, describing the methods of poisoning and trapping rodents which have proved most efficacious in destroying these animals.

MOLES.

Though small and rarely seen because of its underground life, the mole is the subject of frequent and anxious inquiry on the part of farmers and others to whom the mammal is obnoxious chiefly because of the injury it does to lawns and the supposed injury it does to potatoes and other root crops. The latter destruction is, in the vast majority of cases, the work of a very different mammal, the field or meadow mouse, which utilizes the tunnels made by the mole to facilitate its attacks on potatoes, bulbs, and other underground crops.

As attempts to poison moles almost invariably fail because the animal lives chiefly upon insects, experiments have been made during the past year with a variety of traps. Since none of the traps already on the market proved entirely satisfactory a new trap has been devised, for which a patent has been applied for in the name of the Biological Survey, which it is believed will largely solve the problem and afford farmers, lawn owners, and others the means of getting rid of these little mammals easily and cheaply.

BIRD ENEMIES OF THE ALFALFA WEEVIL.

As is well known, the alfalfa weevil, a very destructive insect probably imported from Europe, has become firmly established in Utah, in which State it is doing much damage and from which it threatens to invade contiguous States, with disastrous results to the important alfalfa industry. In cooperation with the Bureau of Entomology the Biological Survey is engaged in investigating the relations of birds to the insect to determine what aid, if any, birds are likely to lend in checking the increase of the weevil and retarding its spread. It is interesting to note that, although the weevil has been established in its new home probably only 5 or 6 years, 31 species of birds have already learned to eat it, and that during the summer it forms nearly one-fifth of their food. It is of interest to note, also, that the English sparrow, which in most parts of the United States is a pest, heads the list as a determined foe of the weevil and feeds its nestlings largely on it. Thus, 170 larvæ of the weevil were found in the stomach of a single nestling. If further investigations to be made in 1912 confirm these results, it may prove advantageous to encourage the breeding of the English sparrow around alfalfa fields by putting up boxes to serve as nesting sites. If it is possible to utilize the services of the English sparrow against this formidable insect foe, the alfalfa weevil, it will be part compensation for the damage done by the bird in other sections.

RELATION OF BIRDS TO THE BOLL WEEVIL.

Several years ago the Biological Survey made a careful examination in Texas of the relation of birds to the boll weevil and published the results. It was shown that birds prey upon the insect while it is hibernating, while on the cotton plants, and during its autumnal migration flight, which is the period when the weevil chiefly extends its range. Similar investigations are being carried on in the territory more recently infested by the boll weevil, especially in Alabama and Mississippi.

BIRDS IN RELATION TO CHESTNUT-BARK DISEASE.

The chestnut-bark disease was introduced into the United States several years ago, has spread into 10 or more States, and will probably continue its progress indefinitely unless means be found to check it. The fungus parasite which causes the disease reproduces by microscopic spores. As these are unprovided with means of locomotion their manner of dispersal, whether by the aid of insects, birds, mammals, or wind, becomes a subject of practical importance as well of scientific interest. It has been assumed that as these spores in certain stages of their development are viscid they may readily become attached to the bill and feet of tree-frequenting birds, and to the feet of certain mammals (like squirrels), and in this manner be transported from one tree to another—even to considerable distances. Some currency indeed has been given to a statement that the spores are spread extensively by birds, especially woodpeckers. Although from their nature it is probable enough that birds and squirrels may aid in distributing the spores, at the present time definite proof is wanting and as yet no direct attempts appear to have been made by means of field observations or otherwise to learn the part played by birds and mammals in distributing the spores. If funds permit, an attempt will be made to ascertain how far birds are concerned in the transportation from tree to tree and from place to place of the chestnut-blight spores.

THE ENGLISH SPARROW.

Introduced into the United States about 1850, the English sparrow has spread over most of the United States, and almost everywhere it has proved a nuisance. It is objectionable about buildings because of its noise and filthiness; it destroys large quantities of grain and small fruit; it is wonderfully prolific and by reason of its numbers and pugnacity it has succeeded in destroying or driving away from the neighborhood of cities and villages many of our small insectivorous birds. It is also cunning and suspicious and very difficult to destroy. During the year attempts have been made to devise a sparrow trap by means of which numbers of the little pest can be trapped at one time and the colonies in a given locality be permanently reduced. It is believed that the problem has been solved, and a bulletin has been published describing the trap, which is of such simple construction that it can be made by every farmer who is provided with the necessary tools and material.

Sparrows have been found to be excellent food and indeed are not infrequently served in restaurants under the name of reed birds. It is strongly recommended, therefore, that in localities where sparrows are too numerous they be trapped for table use, thus utilizing for food a bird which in many places has come to be both a public and a private nuisance.

COOPERATIVE WORK ON THE FOOD OF BIRDS.

As usual, one of the principal features of the work of the bureau during the year was the examination of bird stomachs, which proceeds as rapidly as possible with the present small force. The importance of this work is very great, as it is the only reliable means of obtaining accurate evidence as to the food of birds. By means of a careful analysis of the stomach contents the several species of our American birds are being classified as insect eaters, fruit eaters, seed eaters, etc.; and the ratios also of the component parts of the diet are being tabulated. Thus their relations to agriculture and horticulture are easily stated, whether beneficial or injurious, and approximately the extent of the good or harm they do. Besides examinations of special groups of birds on which the Biological Survey is preparing reports, the work includes the examination of small collections made by request of State officials. During the year the following investigations of this character have been made:

A large series of stomachs of the marsh hawk was examined for the Commission of Fisheries and Game of Massachusetts. These birds were collected near the heath hen preserve on Marthas Vineyard and were found to have fed largely on birds, including some heath hens. The marsh hawk in most regions rarely molests birds, but feeds chiefly on mice and other small rodents. On Cape Cod, Massachusetts, however, the marsh hawk lives to a considerable extent on poultry and small birds and hence must be classed locally as a harmful species.

An effort having been made to remove protection from gulls in Louisiana, a correspondent of the Biological Survey who is interested in protecting these birds sent up a series of stomachs of Franklin's gull in order that definite proof might be had of the bird's economic relations. The food was found to be almost exclusively insectivorous and the bird therefore beneficial.

A number of birds taken in midwinter on Staten Island were examined for the Staten Island Association of Arts and Sciences.

The stomach contents of several Cape May warblers were examined for a member of the West Virginia Experiment Station. The birds were puncturing grapes when shot and information was wanted as to whether they were feeding upon any insect enemies of the grape. Their trait of injuring grapes is in evidence only during a very small proportion of the year. At times the birds are almost exclusively insectivorous.

Other work of the same general nature included the examination of a small collection of duck stomachs from Indian River, Florida, in connection with recommendations to a shooting club in that vicinity regarding plants to be used for attracting ducks.

Some stomachs of horned toads were examined for the Bureau of Entomology in order to learn the relation of these animals to the injurious false wireworms of the Northwestern States.

COOPERATION WITH THE ISLAND OF PORTO RICO.

During the year a request was received from the board of agriculture of the island of Porto Rico for cooperation in an investigation of the bird life of the island with a view of ascertaining the part played by the species native to the island in the destruction of insects inimical to crops. Accordingly an assistant of the Survey was detailed to make the necessary investigation, the expense incident to the work being borne in large part by the department of agriculture of the island. The work is now well under way and from facts already ascertained it appears that the island is deficient in insect-eating birds. Unfortunately the presence of the mongoose in Porto Rico, where it was imported years ago to destroy the cane-eating rats, greatly complicates the situation. It has already destroyed most of the ground-building birds native to the island and those that build in low shrubs, and hence greatly restricts the list of beneficial birds that otherwise might be introduced. The investigations in relation to the birds of Porto Rico will be continued until their habits, especially their economic relations, are thoroughly understood, and later a report will be issued based on the data obtained, with such recommendation as the facts seem to call for.

FOOD OF WILD FOWL.

In continuation of the investigations of the food of wild ducks, an assistant examined duck stomachs obtained in various parts of the country throughout the year and made a trip to important ducking grounds in Arkansas. The trip was made in early summer, at the height of the vegetative season, in order to definitely identify certain vegetable products found in the stomachs of ducks from that locality.

PLANTS TO ATTRACT BIRDS.

The Survey has published a paper on plants useful to attract birds and protect fruit, and continues to gather data on the fruiting season of plants. It is planned to issue circulars which will enable persons in various parts of the country to select such fruit-bearing trees and shrubs as will furnish as nearly as possible a continuous supply of fruit for birds the year round. In pursuance of this work the collections of the New York and St. Louis botanical gardens were consulted and data recorded regarding the locality and season of collecting of all specimens of selected genera of important bird foods which have ripe fruit.

ECONOMIC RELATIONS OF THE CROW.

Seventeen years having elapsed since the publication of a bulletin on the economic relations of the crow, and as at present there is a wide difference of opinion as to the bird's economic status, it was decided that a thorough investigation of the habits of the bird was advisable. To this end a circular requesting information on the relation of the bird to game and wild birds and farm products was widely distributed, and a very large number of replies was received. In addition, special effort was made to increase the number of crow stomachs for examination. In connection with the report on the common crow, the economic relations of the other crows, ravens, and jays of the same family will receive careful consideration.

FOOD OF COMMON BIRDS.

A Farmers' Bulletin entitled "Some Common Birds in Relation to Agriculture," which was prepared by Prof. F. E. L. Beal, of the Biological Survey, many years ago, has always been in great demand. Over a half million copies have been distributed. In order to furnish additional literature of the same nature, the Survey has prepared during the year two other Farmers' Bulletins on familiar species of birds. One of these deals with some common game, aquatic, and rapacious birds in relation to man, and the other treats of the common birds of the forest, field, and garden.

FOOD OF FLYCATCHERS, THRUSHES, AND MEADOWLARKS.

A bulletin on the food of flycatchers, which has been in preparation during the past year, has been published. Stomach examinations for a bulletin on the thrushes, robins, and bluebirds have been completed, and preparation of a manuscript upon these birds is in progress. A very complete study of the food habits of meadowlarks also has been written and is ready for publication.

EUROPEAN STARLING.

Introduced into this country perhaps 20 years ago, the starling has made a place for itself among our native birds, partly by usurping their nesting sites and driving the smaller species away; and it is now rapidly spreading, radiating out from the original localities where introduced. From the experience of other countries into which the starling has been imported, there is reason to fear that the bird may do much damage to food crops, particularly as in fall it has the habit of assembling in flocks numbering thousands of individuals. As its food habits in this country are not well understood, special effort is being made to obtain as many stomachs as possible for examination, so as to insure early issuance of a report on the subject.

BIRDS OF ALABAMA.

As the boll weevil in its advance eastward has reached the State of Alabama and as no list of the birds of this State has ever been published, it seemed important as a preliminary step to further investigations into the relations of birds to the boll weevil in Alabama to ascertain the number of species resident in and visiting the State, either as migrants or as winter residents, and their relative abundance. Accordingly two assistants of the Biological Survey spent several months in the preliminary field investigations necessary to the preparation of a list of the birds of the State and in ascertaining their general economic value and relations. Satisfactory progress has been made in the work, and the list is now being prepared for publication and will be issued with illustrations of certain species important from the economic point of view, especially in relation to the boll weevil.

BIOLOGICAL INVESTIGATIONS.

Field work was continued during the year in Alabama, California, Idaho, Louisiana, and Wyoming, and was begun in North Dakota and Wisconsin.

The practical value of a biological survey of individual States as an important aid in the development of scientific agriculture is becoming more and more appreciated. Reports covering two States—Texas and Colorado—have already been published, with maps showing the life zones, and these are in great demand. As evidence of the growing interest in this work may be cited requests from officials of Alabama, North Dakota, Nebraska, and Iowa for cooperation in a biological survey of these States.

Field work in Alabama has been undertaken and a report upon the life zones of the State is being prepared which will be accompanied by a map showing the life areas and detailed reports on the bird and mammal life of the State and its relation to agriculture.

For several years requests have been received for cooperation with the State University and State Agricultural College of North Dakota in a biological survey of the State, with special reference to a study of its bird and mammal life and their relations to agriculture. By the plan of cooperation arranged the Biological Survey and the State are to share equally in the expenses of field work and in preparing final reports. Field parties of the Biological Survey began work in the spring of 1912, but owing to lack of funds the work will be suspended after June 30. It is hoped that means will be provided for the resumption of this work the next fiscal year.

Requests for cooperation in a biological survey of Iowa and Nebraska have been received and work in those States will be inaugurated as soon as appropriations are available.

Field work which was conducted in Mississippi and Louisiana for several seasons was temporarily suspended. It is intended to resume work in the two States named in the near future should funds be available.

In the fall of 1911 a little field work was done in previously unvisited parts of California.

Field work in Wyoming has been actively pushed and would have been completed during the summer of 1912 but for the necessity of suspending field work on June 30. A few months of additional work will complete the survey of that State, when final reports can be published.

In Idaho field work was continued during the summer of 1911 from the Snake River to the Wyoming line, and up to June 30 of the present season was continued in the central mountain valleys, where the distribution of the ground squirrels and chipmunks and their relations to agriculture were studied.

The final report upon the life zones of New Mexico, with a map, has been completed and is ready for publication.

The report on the birds of Texas is still in course of preparation and is making good progress.

A bulletin on the herons of North America, giving their distribution and migration, is ready for publication. Another bulletin, on the rails of North America, covering similar ground, has also been prepared and is ready for publication. A new and revised edition of a bulletin on the distribution and migration of North American shore birds has been prepared and published during the year. These bulletins are of great value in connection with the enforcement of the Lacey Act and aid in the preparation of game laws, both Federal and State.

A vast amount of valuable data has been gathered during the year from correspondents and from literature concerning the birds and mammals of North America. Good progress has been made also in mapping the distribution of both birds and mammals.

One of the most useful activities of this section of the survey is the identification of birds and mammals sent from public institutions and from individuals engaged in studying them and their relations to agriculture throughout the country.

Cooperation in the biological survey of the Canal Zone being conducted by joint cooperation of the Smithsonian Institution, Department of Agriculture, and War Department continues, and a valuable collection of birds and mammals is being secured, with more valuable data on habits and distribution.

The summer and fall of 1911 E. W. Nelson continued the biological survey of Arizona and made a special effort to secure accurate information concerning the big game resources of that State. A trip was made in the fall in southern California to secure information concerning the distribution and abundance of ground squirrels and to ascertain how successful had been the efforts of the State authorities to exterminate them. Work was continued on the report upon Lower California, which nears completion.

A vast amount of information concerning the bird and mammal life of the United States has been gathered by this section, and this is of great value in connection with the efforts being made to protect and encourage useful and harmless species and to eliminate injurious ones.

IMPORTATIONS.

Supervision of the importation of birds and other animals required by law has been maintained, and 583 permits were issued and 140 consignments inspected by the regular inspectors of the Biological Survey stationed at New York, Philadelphia, and San Francisco, as compared with 519 permits and 123 inspections in 1911. Under these permits there have been imported 428,269 birds and 4,582 mammals. Of these birds there were 338,275 canaries, 15,409 pheasants, 23,181 partridges, 11,353 miscellaneous game birds, and 40,051 miscellaneous nongame birds. Besides these, 28,808 birds and 875 mammals requiring no permits were admitted to entry, making a total of 362,604 canaries, 15,412 pheasants, 23,181 partridges, 11,493 miscellaneous game birds, 44,387 nongame birds, and 5,457 mammals. Fifty-five permits were issued at Honolulu covering the entry of 124 birds, 17 mammals, and 10 reptiles.

Among the birds were 23,181 European partridges, as compared with 36,507 in 1911. This bird has not proved as popular as it did several years ago, and has been purchased in smaller numbers by State commissions and private individuals. The importation of quail from Mexico reached 7,570, as compared with 3,110 in 1911 and 1,246 in 1910. This number might have been much larger but for the suspension in the issue of permits early in February owing to an outbreak of the highly infectious quail disease in the Southwest and the practical cessation of all interstate shipments of quail after that date. Among the rarer waterfowl were some 250 Formosan teal. These birds were first imported into the United States in 1909, but the number brought in during the past fiscal year considerably exceeds that of preceding years. Interesting also was a shipment of 16 California valley quail, imported from Austria. These birds, like wood ducks and other native species, have been sent abroad, where they are raised in captivity and are now being reimported.

Among the miscellaneous nongame birds was one Imperial Amazon parrot (*Amazona imperialis*) imported from Dominica for the New York Zoological Park. This very rare parrot is almost extinct, and the specimen which arrived on February 19, 1912, is apparently the first that has been imported alive into the United States. The shama thrush continues in popularity as a substitute for the mocking bird, as shown by the fact that more than 200 were brought in during the year. Rare birds imported for the first time included several East Indian species, most of which were consigned to the New York Zoological Park. Among the rarer mammals was a female gorilla, received by the park on September 23, 1911, which only lived until October 5. By far the larger number of mammals were guinea pigs and monkeys, imported for laboratory and pathological experiments. About half the squirrels imported are the European red squirrel, and the remainder are chiefly Mexican species. There were also about 1,300 white mice, intended chiefly for research purposes, a few silver and cross foxes, several beavers, and a number of ferrets. The foxes and beavers come from Canada, the former imported for breeding purposes, the latter for exhibition, while the ferrets are imported chiefly for killing rats.

No prohibited species, so far as known, have gained entry during the year. Under date of July 10, 1911, the director of the New York Zoological Park ordered the destruction of the female mongooses belonging to the park, leaving 3 males. One of the latter died in March, and on June 2, 1912, the other two were still on exhibition.

Work on the consolidated index of importations was continued as far as possible, and the index is now complete down to the end of the year 1909.

PENGUIN EGGS.

Attempts are made from time to time to import eggs of certain birds, especially those of lapwings, for market purposes. This year an effort was made to open up a new source of supply by importing the eggs of penguins from South Africa. Under paragraph 560 of the tariff act, which prohibits the entry of eggs of wild birds not intended for propagation, the Secretary of the Treasury on March 29, 1912, instructed the collector of customs at the port of New York to refuse entry to a shipment of penguin eggs from Cape Town. Doubtless the close supervision exercised at ports of entry will tend to discourage similar shipments in future. Advantage was taken of this incident to obtain from the department of agriculture of the Union of South Africa information regarding the traffic in these eggs. It appears that the jackass penguin (*Spheniscus demersus*) breeds in large numbers on certain small islands on the west coast of Cape Province, in the vicinity of St. Helena and Saldanha Bays, and also on the islands off the coast of German southwest Africa. All of these islands are British possessions, and the birds are carefully preserved on account of their economic value. Large quantities of guano, aggregating some 6,000 tons per annum, are collected by the department of agriculture and sold to the farmers, and the collection of eggs is regulated under contract.

QUAIL DISEASE.

The importance of regulating the importation of foreign birds was exemplified in a striking manner during the past season at the time of an outbreak of a highly infectious quail disease (*Colibacillosis tetraonidarum*). This disease spreads with great rapidity. When it was originally discovered by the Bureau of Animal Industry in 1907, large shipments of birds were being made from the West and Southwest. The infection was carried from central Alabama and southern Kansas northeastward to many points, even as far as Nova Scotia, and attempts to check it proved of little avail. During the present year, on account of the scarcity of birds, nearly all the stock used for propagating purposes was imported from Mexico, and such shipments came directly under the control of this department. Immediately upon the discovery of the disease in February all shipments from Mexico were suspended and prompt information concerning the danger of infection was furnished to importers and shippers, with the result that the disease was discovered in only five or six places—in Missouri, District of Columbia, New Jersey, New York, and Connecticut—and so far as could be ascertained did not spread beyond these points.

NATIONAL BIRD RESERVATIONS.

The national bird reservations now number 56, including the Pribilof Reservation, which is in charge of the Department of Commerce and Labor. Four new reservations were created during the year: Forrester Island and Hazy Islands, in Alaska; Niobrara, on the old Fort Niobrara Military Reservation in Nebraska; and Green Bay, in Wisconsin.

The administration of the reservations was better organized by the appointment of inspectors for four districts: One for the Gulf district; one for the reservations in Oregon, California, and eastern Washington; one for the reservations on the coast of Washington; and one for the mountain district. In addition a warden was appointed for Clear Lake Reservation, Cal., and special agents were detailed to inspect the reservations in Bellefourche, S. Dak.; Carlsbad, N. Mex.; the southern reservations in Florida; and Forrester Island, Alaska.

As in former years, permits were issued to trap on two of the Oregon reservations, and the following fur-bearing animals were taken: On Klamath Lake, 124 mink, 10 skunks, 11 weasels, 1 otter, 12 raccoons, and 6 coyotes; and on the Malheur Reservation, 4,858 muskrats, 70 mink, 3 skunks, 2 otters, and 15 coyotes.

During the year the birds on the Florida reservations suffered considerably from severe storms. At Passage Key about 700 nests and eggs were destroyed. On Pelican Island most of the young birds and eggs of the first nesting were lost, and practically all the old birds left the reservation during a bad storm in January, returning, however, in full force later on. Information received in the spring indicated that the reservations were in excellent condition and had fully recovered from their losses.

No species has ever been introduced on any of the bird reservations, with the exception of the European rabbit on Farallon Islands, Cal., and Laysan Island, Hawaii. In both cases they have increased enormously, and efforts will be made to reduce them, as they are already becoming a serious pest.

The following notes on some of the more important reservations show varied conditions under which the birds are protected:

Belle Fourche, S. Dak.—Educational work was carried on quite extensively in this vicinity, and prizes were offered for the best essays on birds submitted by the school children in the county. On April 19 Bird Day was observed for the first time in the schools at Belle Fourche, and our inspector cooperated with the teachers in arousing an interest in the study and protection of birds. Sentiment in favor of the reservation is increasing, and, although there is no regular warden at this point, few attempts are made to violate the regulations, and most of the residents seem to be in favor of stopping spring shooting. On account of the isolated situation of the lake it will be necessary to have a resident warden for at least three months during the hunting season. This is a great refuge for waterfowl and is practically the only place in the county where there are spring ducks. When the project is completed the reservoir will have a water surface of some 8,200 acres and may become an important breeding place for ducks. Its importance as a refuge for migratory birds in spring and fall has already been demonstrated.

Breton Island, La.—Reports show that the birds are steadily increasing and comprise several thousand laughing gulls, brown pelicans, royal terns, and skimmers. No ducks nest on the reservation, but they collect in countless numbers before migrating to the north, so that the reservation serves as an important refuge for the ducks which winter in the Delta region of the Mississippi River.

Clear Lake, Cal.—The limits of this reservation were reduced during the past year to eliminate the dam and the keeper's house, but the area excluded was so small that it in no way affected the value of the reservation. With the completion of the dam the water of the lake has risen more than 10 feet. With its 55 miles of shore line the reservation is a great breeding place for waterfowl, including hundreds of geese and ducks, gulls, and western grebes. Many sage hens and a few white herons are also to be seen.

Cold Springs, Oreg.—No regular warden has yet been appointed, but public feeling is in favor of the reservation, and the hunters in the vicinity have volunteered to use their influence in seeing that the birds are protected. One flagrant violation of the reservation law resulted in several arrests for shooting waterfowl. No indictments were secured, but so much publicity was given the matter that no further trouble is anticipated. From September to May thousands of ducks and geese stop at the reservation, and the geese remain in large numbers all through the winter.

Deer Flat, Idaho.—On account of the hard winter and late spring there was practically no spring shooting about the reservation. So far a volunteer warden has looked after the birds; but as this is rapidly becoming an important nesting ground for waterfowl, a resident warden will be appointed to see that the regulations are properly enforced. As the lake is becoming quite a popular summer resort and numerous boats and launches are operated, regulations were framed, in cooperation with the Reclamation Service, governing the running of boats, placing of wharves, and possession of firearms.

FORRESTER ISLAND, ALASKA.—This new reservation in Alaska, in the Tongass National Forest, has long been the breeding place of various kinds of sea fowl, including the rhinoceros auklet, Cassin's auklet, tufted puffins, murres, and gulls. It has been the custom of the Indians and fishermen to gather vast quantities of the eggs of these birds. During the nesting season a warden will be stationed at Forrester Island to see that the birds are not unduly molested. The Forest Service is cooperating actively in protecting these Alaska reservations.

HAWAIIAN RESERVATION.—Laysan Island has recovered somewhat from the devastation wrought by plume hunters in 1910, but the colonies are still in a sadly reduced condition. Rabbits are increasing with astonishing rapidity, and something must be done to check them, or most, if not all, vegetation on the island will soon be destroyed and the land birds necessarily exterminated. One of the rarest wild ducks in the world, the Laysan teal, is still present in small numbers on the island, and it is hoped that with care it will increase and become abundant. Enormous colonies of Laysan and black-footed albatrosses are found on Laysan Island and Lysianski Island, as well as petrels of several species, noddy and sooty terns, and a few Pacific white terns. There are now about 2,000 Laysan rails, a bird which is particularly interesting, as, like the Laysan teal, it occurs only on this island. Through the cooperation of the Revenue-Cutter Service the *Thetis* visited the reservation twice during the year and reported everything in good condition. If semiannual visits can be made to the reservation by some vessel the birds will not be molested, since under such an arrangement poaching would hardly prove profitable.

KLAMATH LAKE, OREG.—The nesting season of 1911 on the whole was good, although there was a marked decrease in the number of Canada geese. Ducks have held their own, but have decreased considerably in the surrounding country, due to more hunting than usual, early opening of the hunting season, and the large bags allowed. The number of ducks on the reservation is roughly estimated at 10,000. The regulations were generally respected, owing to the activity of the warden. Four arrests were made for having game illegally in possession. Disastrous tule fires occurred during March, which proved very destructive to the nesting grounds, as well as to the fur-bearing animals on the reservation. In order to patrol the reservation and to keep track of the boats which are allowed to run on the lake, a 28-foot launch was provided for the warden. A few tracts of land in the southern part of the reservation which were more valuable for agricultural purposes than for breeding grounds were eliminated during the year and were thrown open to entry.

MALHEUR, OREG. The birds on the reservation were slightly less in number than last season, due to the scarcity of water. Nineteen egrets were seen nesting with a colony of blue and night herons. These birds have not been accustomed to nest on the reservation, although there has been a small colony some 15 miles west. On

April 10 the pelicans began to arrive, and the birds represented on the reservation included mallards, widgeon, sprig, teal, Canada geese, blue herons, night herons, cormorants, grebes, pelicans, gulls, terns, coots, killdeer, avocets, and bitterns. Some trouble was experienced on account of the setting of tule fires, and one of the offenders was convicted and fined $50. A conviction was also secured for killing a swan on the reservation. Every effort has been made to see that the regulations are enforced as strictly as possible without arousing undue antagonism, and conditions have steadily improved during the year.

Minidoka, Idaho.—This reservation, stretching some 30 miles along Snake River, promises to be a great waterfowl preserve. Many ducks are found on the two large islands in the lake formed by the dam, and the rushes which are spreading rapidly along the newly made shore lines will in time make more and more valuable breeding places. The reservation is isolated and will probably not suffer greatly from poaching, except possibly in the spring and fall, when it will be necessary to have some patrolling done. Local sentiment is in favor of protecting the birds and neighboring settlers have volunteered assistance in seeing that they are not molested.

Passage Key, Fla.—Although the severe storms wrought considerable havoc among the birds on the island, the reservation is indeed a wonderful breeding ground. Thousands of Louisiana herons are to be found on the island, great numbers of laughing gulls and black skimmers, and numberless other birds. The reservation is in a rather precarious condition on account of the continued washing away of the shore at one end, more than 200 feet having washed away since 1905.

Pelican Island, Fla.—The breeding season in 1911 began unusually early. The first eggs were laid on October 20 and the first young hatched on November 17. The month of November was very stormy. In January the severe storms destroyed practically all the eggs and the young, with the exception of about 100 half-grown ones, so that the winter proved rather disastrous to the birds. About 2,000 old birds returned to the reservation in February and nesting began again on March 9. On the 1st of April there were some 550 nests with eggs and hatching began on the 13th. Nearly 100 visitors stopped at the reservation during the winter and spring.

NATIONAL BISON RANGE.

With the 10 calves born this spring, the buffalo on the National Bison Range have now increased to 81, making an increase of 44 over the original number placed on the range in October, 1909. The only loss among the buffalo was one old cow. As it was found that the beaver had all disappeared from Mission Creek, arrangements were made to procure some stock from the Yellowstone National Park, and it is expected that a few animals will be transferred next autumn. In March, 5 elk were shipped from Jackson Hole, Wyo., but 2 of these died from injuries received while en route. The antelope on the range have become somewhat scattered, but 5 were seen recently near headquarters.

ELK IN JACKSON HOLE.

The work of caring for the elk in Jackson Hole was continued through the winter in cooperation with the State authorities of Wyoming, and plans for the transfer of small herds to suitable locations elsewhere were successfully carried out. Important data were collected on the life history and distribution of the species, with a view to permanently improving the conditions which have prevailed in recent years. Feeding began on January 14 and continued until April 15. During these three months 920 tons of hay were fed, of which 760 were furnished by the department and the balance by the State. A greater number of elk were fed in March than at any other time, owing to the unusually severe weather, and during one week about 4,000 head were provided with food. In all, it is estimated that about 7,250 elk were fed during the winter.

On February 12, the first consignment, consisting of 22 head of young elk, was shipped to the Sundance National Forest near Spearfish, S. Dak. During March, 10 elk were transferred to the Fish Lake National Forest in Utah; 15 to the Billy Meadows, on the Wallowa National Forest in Oregon; 8 to the Wichita Game Preserve, Okla., in cooperation with the Forest Service; 5 to the National Bison Range, Mont.; and 3 to the city park at Boulder, Colo. The State warden arranged for the transfer of more than 100 head, chiefly calves, to Laramie Peak, Encampment, and other points in the State. The losses consequent on making these transfers were comparatively small. The shipment to the Billy Meadows reached its destination in safety and attracted much attention all along the route.

In cooperation with the Forest Service a census was made of the elk just before they left their winter feeding grounds, and it was estimated that about 17,260 wintered in Jackson Hole and vicinity this season. The total loss was 716, and of the survivors 1,700 were calves.

At the request of the Department a similar census was made by the superintendent of the Yellowstone National Park, and the total number which wintered in the northern part of the park and along the northern boundary was found to be about 30,100. These figures show that the total number of elk in Jackson Hole and the park is in reality somewhat less than 50,000.

ANTELOPE.

The condition of antelope in the West demands serious consideration and well-directed effort to prevent the species from becoming extinct in several States in which it was formerly abundant. It is not too much to say that the antelope is in greater danger of extermination than any other kind of American big game. The Yellowstone Park to-day contains less than half as many antelope as it did four years ago, and not a single National game refuge has thus far been established in a region where antelope still remain. Attempts to stock the bison range in Montana and the Wichita preserve in Oklahoma have not thus far met with much success. Twelve animals were sent to each of these preserves in the winter of 1910–11. Several of those on the bison range and on the Wichita preserve have died. Efforts to secure additional animals for these preserves during the past year have failed. There should be herds of at least 25 head each on the bison range and on the Wichita preserve; strong nucleus herds on the Niobrara Bird Reservation in Nebraska and on the Wind Cave National Park in South Dakota. More important still would be the establishment of a suitable preserve, especially for antelope, in the antelope country. Provision for such a refuge is contained in a bill now pending which authorizes the establishment of the Snow Creek Antelope Range in Montana.

Thus far more effective protection seems to have been accorded the antelope on the private ranges in the Southwest than under either Federal or State auspices. In order to ascertain the condition of these antelope a systematic effort was begun last autumn to find out the location, size, and present condition of the various small bands in western Oklahoma, Texas, and eastern New Mexico. A considerable area in these States was covered by a representative from the Department and much valuable information procured. It is planned to continue this investigation as opportunity permits and extend it to other parts of the West in order to secure data necessary for ascertaining the true condition of antelope in the Western States.

GAME PROTECTION IN ALASKA.

At the close of the fiscal year new regulations were issued under the Alaska game law to afford additional protection to deer and walrus, prevent the excessive traffic in moose on the Kenai Peninsula, and to suspend deer hunting on five islands in southeastern Alaska, thus practically making them game refuges. The suspension of the sale of venison in 1911 has been continued through the season of 1912. Through cooperation with the Secretary of the Treasury, special instructions were given to the revenue cutters patrolling Bering Sea to insure a strict enforcement of the law protecting walrus.

Under the appropriation of $15,000 for the protection of game, wardens appointed by the governor were stationed at several of the more important points. The annual report of the governor, setting forth in detail the enforcement of the law, was published by the Survey as Circular 85. Sixteen permits were issued for the collection of specimens for scientific purposes or for exhibition.

INFORMATION CONCERNING GAME.

Through cooperation with the Forest Service, comprehensive data were collected for the first time regarding the number of big game animals killed on the various national forests, and as these forests include the principal hunting districts in the western States, the data thus collected furnish a practically complete basis for estimating the total number of big game killed in several of the western States. In addition, two representatives of the Bureau were detailed for some time in the summer and early autumn—Mr. D. C. Nowlin, in Idaho and eastern Oregon, to collect definite information concerning antelope and deer; and Mr. A. C. Cooper, in western Texas and eastern

New Mexico, to collect similar information regarding antelope and to examine certain locations suitable for game refuges. Mr. E. W. Nelson, during a visit to Arizona, collecting information regarding the proposed refuge on one of the national forests in that State.

The index of game legislation has been almost completed. During the year the laws of Maine, Massachusetts, New Hampshire, Rhode Island, Connecticut, Pennsylvania, and most of those of New York were indexed. At the present time the only gaps in the index are a few years in New York, Maryland, and North Carolina. The work had advanced to a point, early in the year, which warranted the publication of a summary of some of the more important provisions under the title "Chronology and Index of American Game Protection from 1796 to 1911."

Much time has been devoted to correlating, summarizing, and preparing for ready reference the material on game protection collected during the past decade. Summarized tables showing the protection accorded certain species of game birds at 10-year intervals from 1850 to 1910 have been prepared. Data on the protection of migratory birds have been summarized and information brought down to date on the subject of hunting licenses, national and State game preserves, bag limits, game commissions, and similar topics concerning which frequent requests for information are received. As in several previous years, the data concerning the number and details of fatal hunting accidents were collected. These data show a regular increase in the number of fatalities in the United States from year to year, but it is believed that a certain proportion of these accidents can be obviated by special legislation.

The usual annual game publications were issued, including the "Directory of Game Officials" and "Summary of the Game Laws for 1911."

In order to meet the demand for information regarding various national bird and game refuges, data were collected and arranged for publication on the various national reservations which can be utilized for the preservation of wild life, including national parks, military parks, game preserves, bird reservations, fur-seal and lighthouse reservations, and such portions of the national forests as have been made State game preserves. The date of establishment, location, and area of each reservation were brought together for a circular, and this information was supplemented by a brief bibliography of the publications on the fauna of the reservations.

PLUMAGE.

Every effort has been made to stop the sale of plumage of certain birds, particularly herons, which have been slaughtered for the millinery trade in recent years. Information regarding the distribution of the egrets has been collected and published in the form of a brief circular for the use of State officers. Assistance has been rendered wherever possible, and in Ohio the attention of the State game commission was brought to the illegal sale of plumage in Cincinnati, which resulted in successful action against six of the largest millinery stores in the city. In Florida information has been collected regarding plume hunting in the Everglades and the surreptitious shipment of aigrettes from certain points in the State. In Missouri and Pennsylvania also steps have been taken to restrict the traffic, and evidence has been collected, and cases are now pending in the courts of both of these States.

INTERSTATE COMMERCE IN GAME.

During the past year the Bureau has given close attention to the enforcement of sections 242 and 243 of the criminal code relating to the transportation of game in interstate commerce. The revised code in effect January 1, 1910, amended section 242 by providing that game shipped in interstate commerce in violation of the law of the State from which shipped was unlawful. This has materially assisted in the securing of evidence necessary to warrant proceeding in the Federal courts.

In every instance the active cooperation of the State authorities, where a State warden service is maintained, has been secured, and to the assistance given the representative of this Bureau by the Pennsylvania Game Commission and the State Game, Fish, and Forestry Warden Department of Michigan, and the warden departments of Minnesota, Wisconsin, and Illinois is attributable much of the success which has resulted in these States.

Michigan.—During the entire month of October, 1911, an assistant from this Bureau investigated game conditions in the Upper Peninsula of Michigan, giving particular attention to the smuggling of game out of the State. Under orders of the Michigan warden all deputies were directed to assist our representative, and as a result many violators were apprehended and infractions of the State laws punished in the State courts. A number of cases involving attempted export of game from the State have been reported for prosecution in the Federal court for that district, and of these three have already been disposed of by pleas of guilty.

Pennsylvania.—The inspection during the month of February last of the game markets of Philadelphia, Pittsburgh, and Harrisburg by the secretary of the Pennsylvania Game Commission and an assistant detailed from this office resulted in the securing of evidence sufficient to warrant criminal proceedings against shippers in Maryland, Kentucky, West Virginia, Virginia, and North Carolina. It will be noticed that in none of these States are they provided with an efficient warden service, in nearly every instance the enforcement of the game laws being left entirely to local officers. It should be added, however, that the discovery by this Bureau of evidence disclosing the shipment during the months of November and December last of more than 6,000 quail from one point in Kentucky resulted in the immediate enactment of a modern, up-to-date game commission bill providing for salaried wardens and supported by a general hunting-license system.

Virginia.—Considerable time was spent in the coast region of Virginia, in the counties of Princess Anne, Norfolk, Northampton, and Accomac, investigating waterfowl conditions, and it was found large numbers of black mallards were annually trapped on the low marshy lands near the coast and shipped to the game markets of other States. A number of prosecutions were begun both against the shippers and the transportation companies receiving such game for shipment. However, when the first case was tried in the Federal court at Norfolk a ruling of the court regarding the State law and the authority of boards of supervisors to change the section regulating export from the State in their respective counties made it inadvisable to proceed with the trials, and, upon motion of the United States attorney, they were all dismissed.

ARKANSAS.—Conditions are improving in the State generally, and a number of prosecutions in the Federal courts at Helena and Jonesboro, including the imposition of jail sentences against a number of persons residing near Big Lake, charged with interfering with a deputy United States marshal traveling on official duty, has resulted in greatly improved conditions in that part of the State.

INTERSTATE SHIPMENTS BY MAIL.

Complaints have been filed with this Bureau that protected fur-bearing animals are being shipped in interstate commerce by mail. With the cooperation of the Post Office Department an effort is being made to discourage this practice, and one case has already been reported for prosecution.

OUTLINE OF WORK FOR 1913.

ECONOMIC ORNITHOLOGY AND MAMMALOGY.

During the year 1913 the Division of Economic Investigations will continue the work of repressing rodents in connection with reforestation projects in the National Forests of Colorado, Washington, Arizona, Montana, Idaho, and California. Owing to the success met with in killing prairie dogs in the Cochetopa and Pike Forests of Colorado and the Coconino Forest of Arizona during 1912, the work will be extended in these Forests and carried to others. Preliminary work in the control of ground squirrels on public lands in California in connection with the suppression of bubonic plague will be carried on. Experiments in rearing fur-bearing animals will be undertaken. Examination of the food of wild ducks will be continued, and that of the crow, English sparrow, and swallows will be commenced. A report, in cooperation with the island authorities, will be prepared on the economic habits of Porto Rican birds. Investigation of the relation of birds to the cotton boll and alfalfa weevils will be continued. Experiments will be carried on to devise means for controlling pine mice and rabbits in orchards and nurseries. Field work to study methods of control of moles and gophers in the Puget Sound region will be taken up. Demonstrations to determine economic methods of controlling crawfish as crop destroyers in the South will be continued.

GEOGRAPHIC DISTRIBUTION.

During the coming year a comparatively small amount of field work will be undertaken, owing to lack of funds. Office work will be continued in mapping the distribution of birds and mammals and in the collection of data on the habits and migration of birds. A report will be completed for publication on a trip made by E. A. Preble in British Columbia in the summer of 1910. The report on the birds of Texas will be completed for publication and final reports on the biological survey of New Mexico will be published. A final report on the survey of Wyoming, so far as the work has gone, will be prepared.

A detailed report on Lower California, with map, will be completed for publication. The present international interest in this region renders this report especially important and opportune.

GAME PRESERVATION.

Several new projects will require attention during the early autumn of 1912. Under the appropriation of $26,000 for establishment of a national game preserve on the Wind Cave National Park, in South Dakota, arrangements will be made for the purchase of lands controlling the necessary water supply and also contracts made for fencing a portion of the park for the herd of buffalo to be presented by the American Bison Society. Efforts will be made to place the winter feeding of elk in Jackson Hole on a more permanent basis by the acquisition of a refuge, where hay can be produced and fed during the winter. Efforts will be renewed to obtain authorization and an appropriation for fencing the Niobrara Reservation, in Nebraska, so that it may be used as a big-game preserve. It is planned to send an expedition to Laysan early in the winter to guard against poaching and also to effect a reduction in the number of rabbits on the island. Warden service will be installed on several additional reservations, including Forrester Island, Alaska; and Minidoka and Deer Flat, Idaho. Efforts will be made to insure a stricter compliance with the Federal law governing interstate shipments of game, particularly in the States of Pennsylvania, Virginia, North Carolina, Kentucky, Illinois, and Arkansas, and also to extend the work to traffic in plumage.

REPORT OF THE CHIEF OF THE DIVISION OF ACCOUNTS AND DISBURSEMENTS.

United States Department of Agriculture,
Division of Accounts and Disbursements,
Washington, D. C., November 6, 1912.

Sir: I have the honor to submit herewith a report of the work of the Division of Accounts and Disbursements for the fiscal year ended June 30, 1912.

Very respectfully,
A. Zappone,
Chief of Division.

Hon. James Wilson,
Secretary of Agriculture.

CHARACTER OF WORK.

The Division of Accounts and Disbursements examines, adjusts, and pays all accounts and claims against the department; decides questions involving the expenditure of public funds; prepares advertisements for all work and supplies not contracted for by the General Supply Committee of the Executive Departments; prepares letters of authority; writes, for the signature of the Secretary, all letters to the Treasury Department pertaining to fiscal matters; examines requisitions for the purchase of supplies; issues bills of lading and requests for passenger and freight transportation; prepares the annual estimates of appropriations; prepares annual fiscal reports to Congress; and transacts all other business relating to the financial interests of the department.

ORGANIZATION.

For the purpose of systematizing its work, the division is divided into five sections, as follows:

Cashier's section.—This section prepares and mails all checks and handles all moneys received and disbursed.

Auditing section.—This section audits all salary, reimbursement, purchase, telegraph, and express accounts.

Bookkeeper's section.—This section keeps all books pertaining to the fiscal affairs of the department, indexes all accounts, prepares all requisitions on the Treasury for advances of public funds, compiles for rendition to the accounting officers of the Treasury the quarterly abstracts of expenditures and collections and the account current covering the liability for public funds, and has charge of the correspondence with the accounting officers of the Treasury in the settlement of accounts.

MISCELLANEOUS SECTION.—This section has charge of the preparation of the several annual reports to Congress and the administrative examination of the accounts of the Forest Service and of the Weather Bureau; also audits all accounts of the Board of Consulting Scientific Experts.

FREIGHT AND TRANSPORTATION SECTION.—This section audits all passenger and freight accounts and prepares and issues all passenger transportation requests and bills of lading covering freight shipments.

WORK OF THE YEAR.

APPROPRIATIONS, EXPENDITURES, ETC.

The total appropriations for the department for the year ended June 30, 1912, amounted to $21,172,880.53, not including $1,440,000 appropriated for the several State agricultural experiment stations. Of this sum ($21,172,880.53), $16,032,446.08 was disbursed prior to the close of the year, leaving a balance of $5,140,434.45, nearly all of which is covered by outstanding liabilities. Supplemental accounts for the year 1911 were also paid, amounting to $1,214,424.51. The unexpended balances for the year 1910, amounting to $410,828.27, were finally covered into the Treasury on June 30, 1912.

There were received, audited, and paid 70,987 accounts, amounting to $12,813,366.88 (not including Forest Service). In payment of these accounts 133,163 checks were drawn on the Treasury at Washington and the Subtreasuries at New York and at Chicago.

There were also audited and sent to the Treasury Department for payment 4,221 accounts.

LOST CHECKS.

During the year 62 checks were lost in transit through the mails or by the payees.

REQUISITIONS, LETTERS, AND REQUESTS.

One hundred and twelve requisitions were drawn on the Treasury, aggregating $12,156,211.79. (This does not include Forest Service.)

The number of requisitions issued for supplies was 25,771.

The number of letters of authorization for travel was 6,683.

The number of letters written and received in the ordinary transaction of business was about 115,000.

The number of requests for passenger transportation was 38,207.

The number of requests on the Quartermaster General for the transportation of Government property was 15.

The number of departmental bills of lading issued was 4,088.

TEMPORARY SPECIAL DISBURSING AGENTS.

Twenty-eight temporary special disbursing agents and seven district fiscal agents were active during the year, and the sum of $5,405,505.81 from the appropriations of the department was advanced to them, requiring the issuance of 176 requisitions upon the Treasury. The total number of temporary special disbursing agents and district fiscal agents shown includes 8 and 7, respectively, for Forest Service, to whom $5,244,300.81 was advanced, requiring 105 requisitions upon the Treasury. All accounts of temporary special disbursing agents and district fiscal agents of the department were given an administrative examination in this division before being forwarded to the Treasury Department for final audit and settlement.

MILEAGE BOOKS.

During the fiscal year 1,722 mileage and scrip books were purchased for official use by employees of this department, at a cost of $48,101. Rebates on these books, amounting to $4,096.11, were deposited in the Treasury to the credit of the appropriations.

COMBINED ACCOUNTS.

There were about 5,000 combined accounts handled during the fiscal year 1911, and it is estimated that the preparation of at least 25,000 checks was thereby avoided, to say nothing of the saving in clerical labor.

APPROPRIATIONS, DISBURSEMENTS, AND UNEXPENDED BALANCES FOR THE FISCAL YEAR 1912.

The table following shows for the fiscal year the amounts appropriated, disbursed, and unexpended:

Appropriations, disbursements, and unexpended balances for the fiscal year 1912.

Object.	Subappropriations.	Transfer of funds.[1]	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
Salaries, Department of Agriculture (Forest Service included in main caption)	....	....	$2,318,680.00	$2,100,353.41	$218,326.59
Improvement of the national forests	....	....	500,000.00	461,515.61	38,484.39
General expenses, Forest Service, 1911-12	....	....	70,000.00	70,000.00	....
General expenses, Forest Service	....	....	2,644,420.00	2,224,924.77	419,495.23
Fighting forest fires	$80,000	$2,796.99	82,796.99	80,146.99	2,650.00
Maintenance and supplies	198,080	7,394.19	205,474.19	128,942.95	76,531.24
Forest products	177,040	914.73	176,125.27	151,957.67	24,167.60
National forest range investigations	18,420	775.00	19,195.00	14,241.18	4,953.82
Silviculture, national forests	166,640	5,946.83	172,586.83	152,089.19	20,497.64
Management of forests	84,528	11,409.67	73,118.33	62,663.28	10,455.05
Market and miscellaneous investigations	33,760	4,457.37	29,302.63	20,322.65	8,979.98
Absaroka National Forest	11,520	5,407.86	6,112.14	5,122.28	989.86
Alamo National Forest	8,770	3,303.27	5,466.73	4,930.58	536.15
Angeles National Forest	19,983	7,910.26	12,072.74	9,451.43	2,621.31
Apache National Forest	11,677	652.00	11,025.00	8,045.09	2,979.91

[1] And not to exceed 10 per cent of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided for shall be available interchangeably for expenditure on the objects included within the general expenses of such bureau, division, or office, but no more than 10 per cent shall be added to any one item of appropriation except in cases of extraordinary emergency, and then only upon the written order of the Secretary of Agriculture.

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
General expenses, Forest Service—Continued.					
Arapaho National Forest	$11,484	$1,352.39	$12,836.39	$11,264.55	$1,571.84
Arkansas National Forest	13,783	548.28	13,234.72	12,402.21	1,832.51
Ashley National Forest	10,184	6,145.25	4,038.75	3,243.70	795.05
Battlement National Forest	7,584	2,433.38	5,150.62	4,563.66	586.96
Beartooth National Forest	10,305	3,961.81	6,343.19	5,933.40	409.79
Beaverhead National Forest	12,700	5,870.00	6,830.00	5,781.13	1,048.87
Bighorn National Forest	18,538	2,424.34	16,113.66	8,902.24	7,211.42
Bitterroot National Forest	22,847	13,718.00	9,129.00	7,749.40	1,379.60
Blackfeet National Forest	18,262	1,840.33	16,421.67	14,811.16	1,610.51
Black Hills National Forest	9,420	2,136.00	7,284.00	5,588.15	1,695.85
Boise National Forest	9,173	1,429.34	7,743.66	6,307.48	1,436.18
Bonneville National Forest	3,395	638.50	2,756.50	2,397.42	359.08
Bridger National Forest	4,899	2,665.67	2,233.33	1,978.19	255.14
Cabinet National Forest	18,341	4,454.58	13,886.42	13,127.82	758.60
Cache National Forest	5,953	842.66	5,110.34	3,642.03	1,468.31
California National Forest	12,091	2,691.00	9,400.00	7,831.08	1,568.92
Caribou National Forest	3,702	561.42	3,140.58	2,387.09	753.49
Carson National Forest	15,920	518.05	16,438.05	14,571.04	1,867.01
Cascade National Forest	14,084	4,249.00	9,835.00	9,552.14	282.86
Challis National Forest	8,679	3,902.33	4,776.67	3,740.71	1,035.96
Chelan National Forest	10,407	3,728.67	6,678.33	6,311.05	367.28
Chiricahua National Forest	5,459	1,472.27	6,931.27	4,447.57	2,483.70
Chugach National Forest	25,280	11,865.23	13,414.77	11,542.05	1,872.72
Clearwater National Forest	14,843	3,134.92	11,708.08	9,569.25	2,138.83
Cleveland National Forest	17,937	10,460.27	7,476.73	8,361.84	[1] 885.11
Cochetopa National Forest	9,540	3,036.00	6,504.00	5,425.00	1,079.00
Coconino National Forest	14,942	252.23	15,194.23	13,391.34	1,802.89
Coeur d'Alene National Forest	16,155	597.78	16,752.78	12,313.76	4,439.02
Colorado National Forest	10,528	3,471.72	7,056.28	6,109.61	946.67
Columbia National Forest	16,472	951.12	15,520.88	12,024.45	3,496.43
Colville National Forest	13,525	4,339.00	9,186.00	8,276.02	909.98
Coronado National Forest	15,517	10,725.00	4,792.00	4,044.36	747.64
Crater National Forest	20,355	691.85	21,046.85	17,560.75	3,486.10
Crook National Forest	8,756	4,889.00	3,867.00	3,023.67	843.33
Custer National Forest	6,386	354.34	6,031.66	5,286.84	744.82
Dakota National Forest	933	308.00	625.00	533.32	91.68
Datil National Forest	18,304	7,037.61	11,266.39	8,250.66	3,015.73
Deerlodge National Forest	16,540	2,115.00	18,655.00	15,592.04	3,062.96
Deschutes National Forest	8,258	1,292.14	9,550.14	7,810.55	1,739.59
Dixie National Forest	4,237	42.13	4,279.13	3,406.81	872.32
Durango National Forest	11,111	4,621.00	6,490.00	5,357.96	1,132.04
Eldorado National Forest	10,208	1,708.00	8,500.00	6,921.37	1,578.63

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[1] $2,140.11 to be transferred from Bureau of Animal Industry.

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
General expenses, Forest Service—Continued.					
Fillmore National Forest	$5,477	$1,196.00	$4,281.00	$3,184.86	$1,096.14
Fishlake National Forest	3,889	364.00	3,525.00	2,124.28	1,400.72
Flathead National Forest	28,151	579.20	27,571.80	24,473.42	3,098.38
Florida National Forest	6,970	1,290.00	8,260.00	6,775.70	1,484.30
Fremont National Forest	12,592	3,257.00	9,335.00	8,345.41	989.59
Gallatin National Forest	12,505	6,897.83	5,607.17	4,930.51	676.66
Gila National Forest	17,606	984.00	18,590.00	15,833.03	2,756.97
Gunnison National Forest	8,813	459.50	9,272.50	6,479.45	2,793.05
Harney National Forest	8,217	1,467.00	6,750.00	5,253.58	1,496.42
Hayden National Forest	7,626	2,521.00	5,105.00	4,146.41	958.59
Helena National Forest	10,955	4,151.17	6,803.83	5,877.55	926.28
Holy Cross National Forest	8,469	2,824.00	5,645.00	4,796.51	848.49
Humboldt National Forest	15,180	6,698.55	8,481.45	7,190.37	1,291.08
Idaho National Forest	10,720	2,800.00	7,920.00	6,972.47	947.53
Inyo National Forest	9,503	2,166.83	7,336.17	6,493.06	843.11
Jefferson National Forest	11,930	4,503.22	7,426.78	5,824.48	1,602.30
Jemez National Forest	15,409	2,288.05	13,120.95	11,012.72	2,108.23
Kaibab National Forest	6,982	1,760.06	5,221.94	4,595.70	626.24
Kaniksu National Forest	20,568	1,499.33	19,068.67	14,887.99	4,180.68
Kansas National Forest	2,263	548.00	1,715.00	1,556.03	158.97
Kern National Forest	16,059	5,960.11	10,098.89	9,194.65	904.24
Klamath National Forest	19,192	3,065.98	22,257.98	18,184.93	4,073.05
Kootenai National Forest	25,977	1,128.00	24,849.00	23,105.41	1,743.59
La Sal National Forest	4,719	471.90	5,190.90	5,004.48	186.42
Lassen National Forest	12,865	35.18	12,829.82	11,555.92	1,273.90
Leadville National Forest	14,608	8,243.00	6,365.00	5,437.84	927.16
Lemhi National Forest	6,609	209.50	6,818.50	5,381.40	1,437.10
Lewis and Clark National Forest	12,917	4,443.67	8,473.33	7,494.66	978.67
Lincoln National Forest	6,982	3,737.67	3,244.33	2,799.58	444.75
Lolo National Forest	18,839	2,150.94	16,688.06	14,142.51	2,545.55
Loquillo National Forest	2,408	95.00	2,313.00	278.15	2,034.85
Madison National Forest	14,121	5,824.75	8,296.25	7,215.20	1,081.05
Malheur National Forest	12,790	5,188.06	7,601.94	6,912.66	689.28
Manti National Forest	6,807	680.70	7,487.70	5,928.32	1,559.38
Manzano National Forest	3,963	1,183.00	2,780.00	1,974.39	805.61
Marquette National Forest	2,167	1,093.85	1,073.15	1,494.40	[1]421.25
Medicine Bow National Forest	14,307	3,688.55	17,995.55	13,330.68	4,664.87
Michigan National Forest	2,829	221.00	3,050.00	2,763.41	286.59
Minam National Forest	6,356	2,030.07	4,325.93	2,975.01	1,350.92
Minnesota National Forest	10,720	2,809.00	7,911.00	7,099.23	811.77
Minidoka National Forest	4,484	157.00	4,641.00	3,103.75	1,537.25
Missoula National Forest	20,561	9,781.99	10,779.01	9,618.23	1,160.78
Moapa National Forest	1,101	200.00	901.00	422.14	478.86
Modoc National Forest	12,219	4,019.00	8,200.00	7,254.48	945.52

[1] $484.64 to be transferred from War Department.

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
General expenses, Forest Service—Continued.					
Mono National Forest	$10,924	$6,674.00	$4,250.00	$3,393.35	$856.65
Monterey National Forest	2,534	253.40	2,787.40	2,436.54	350.86
Montezuma National Forest	8,956	1,421.31	7,534.69	6,117.98	1,416.71
Nebo National Forest	1,558	404.00	1,154.00	829.44	324.56
Nebraska National Forest	2,919	237.34	2,681.66	2,329.15	352.51
Nevada National Forest	7,139	1,784.94	5,354.06	4,097.51	1,256.55
Nezperce National Forest	23,036	10,837.08	12,198.92	11,048 88	1,150.04
Ochoco National Forest	11,641	2,481.00	9,160.00	7,420.86	1,739.14
Okanogan National Forest	16,745	3,501.78	13,243.22	12,471.59	771.63
Olympic National Forest	15,962	1,825.33	14,136.67	12,475.69	1,660.98
Oregon National Forest	19,462	1,033.72	18,428.28	14,710.57	3.717.71
Ozark National Forest	11,496	760.00	12,256.00	11,639.05	616.95
Palisade National Forest	9,739	2,829.00	6,910.00	5,404.08	1,505.92
Paulina National Forest	13,802	5,530.22	8,271.78	7,332.86	938.92
Payette National Forest	15,158	885.01	14,272.99	11,837.17	2,435.82
Pecos National Forest	11,737	589.66	12,326.66	9,642.69	2,683 97
Pend d'Oreille National Forest	14,446	373.99	14,819.99	14,069.75	750.24
Pike National Forest	17,184	1,882.00	15,302.00	13,438.32	1,863.68
Plumas National Forest	17,900	726.30	17,173.70	15,152.60	2,021.10
Pocatello National Forest	3,327	2,461.00	866.00	693.12	172.88
Powell National Forest	4,911	4,101.00	810.00	428.95	381.05
Prescott National Forest	6,248	1,433.00	4,815.00	4,585.95	229.05
Rainier National Forest	13,603	2,098.80	11,504.20	9,337.47	2,166.73
Rio Grande National Forest	10,750	2,245.69	8,504.31	7,276.94	1,227.37
Routt National Forest	11,225	1,303.39	9,921.61	8,252.05	1,669.56
Salmon National Forest	17,449	6,568.75	10,880.25	9,402.68	1,477.57
San Isabel National Forest	9,546	3,662.55	5,883.45	5,178.63	704.82
San Juan National Forest	11,791	5,018.23	6,772.77	5,665.59	1,107.18
Santa Barbara National Forest	14,157	3,190.59	10,966.41	9,381.38	1,585.03
Santiam National Forest	11,028	211.89	10,816.11	8,723.59	2,092.52
Sawtooth National Forest	8,487	2,382.00	6,105.00	4,902.68	1,202.32
Selway National Forest	20,962	3,932.06	17,029.94	15,667.97	1,361.97
Sequoia National Forest	18,719	6,279.00	12,440.00	10,598.89	1,841.11
Sevier National Forest	3,046	304.60	3,350.60	3,014.65	335.95
Shasta National Forest	17,816	1,434.00	19,250.00	15,862.49	3,387.51
Shoshone National Forest	7,710	771.25	6,938.75	5,908.85	1,029.90
Sierra National Forest	19,823	6,440.70	13,382.30	11,534.34	1,847.96
Sioux National Forest	5,634	1,248 73	4,385.27	3,686.18	699.09
Siskiyou National Forest	15,015	3,455.00	11,560.00	10,340.31	1,219.69
Sitgreaves National Forest	12,881	1,482.27	11,398.73	8,531.92	2,866.81
Siuslaw National Forest	10,491	1,561.64	8,929.36	7,628.83	1,300.53
Snoqualmie National Forest	20,007	3,662.00	16,345.00	14,958.81	1,386.19
Sopris National Forest	10,019	3,273.77	6,745.23	5,218.87	1,526.36
Saint Joe National Forest	21,536	8,643.86	30,179.86	23,817.40	6,362.46
Stanislaus National Forest	16,718	2,789.80	13,928.20	13,563.47	364.73

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on tions.
General expenses, Forest Service—Continued.					
Sundance National Forest	$3,599	$835.66	$2,763.34	$2,362.86	$400.48
Superior National Forest	10,533	2,504.67	8,028.33	5,959.41	2,068.92
Tahoe National Forest	18,647	2,597.00	16,050.00	14,338.18	1,711.82
Targhee National Forest	11,424	350.00	11,774.00	10,885.79	888.21
Teton National Forest	9,125	2,697.67	6,427.33	4,273.69	2,153.64
Toiyabe National Forest	7,223	1,324.50	5,898.50	5,377.68	520.82
Tongass National Forest	23,041	1,282.43	21,758.57	19,886.03	1,872.54
Tonto National Forest	7,433	1,335.83	6,097.17	5,351.51	745.66
Trinity National Forest	23,113	1,107.00	24,220.00	21,224.13	2,995.87
Tusayan National Forest	11,918	771.00	11,147.00	9,909.87	1,237.13
Uinta National Forest	6,090	1,033.35	5,056.65	4,014.99	1,041.66
Umatilla National Forest	8,517	596.00	7,921.00	6,656.33	1,264.67
Umpqua National Forest	14,408	3,315.10	11,092.90	9,363.08	1,729.82
Uncompahgre National Forest	10,756	2,856.41	7,899.59	6,747.00	1,152.59
Wallowa National Forest	12,188	3,123.00	9,065.00	7,679.34	1,385.66
Wasatch National Forest	2,396	851.00	1,545.00	1,487.43	57.57
Washakie National Forest	7,595	4,404.00	3,191.00	2,689.66	501.34
Washington National Forest	14,945	5,679.00	9,266.00	8,175.07	1,090.93
Weiser National Forest	14,066	6,891.00	7,175.00	6,203.25	971.75
Wenaha National Forest	9,805	4,166.99	5,638.01	5,126.41	511.60
Wenatchee National Forest	11,478	4,869.67	6,608.33	5,997.21	611.12
White River National Forest	11,779	3,135.50	8,643.50	7,334.66	1,308.84
Whitman National Forest	17,521	4,108.26	13,412.74	11,298.97	2,113.77
Wichita National Forest	11,978	8,489.23	3,488.77	2,232.76	1,256.01
Wyoming National Forest	9,438	775.00	8,663.00	7,402.76	1,260.24
Zuñi National Forest	5,287	3,100.00	2,187.00	1,457.80	729.20
General administration, 15 per cent			400,718.38	359,805.69	40,912.69
Special appropriations:					
Refunds to depositors, excess of deposits, national forests fund			64,413.56	47,716.54	16,697.02
Cooperative work, forest investigations			7,285.11	2,959.65	4,325.46
National Bison Range			707.57	104.98	602.59
Burial expenses, etc., and relief of dependent relatives of fire fighters on national forests, 1911-12			15,000.00	6,754.05	8,245.95
Reimbursement to temporary employees of forest service for time lost fighting fires on national forests			5,450.00	5,053.67	396.33
Reimbursement for horses, etc., lost fighting fires on national forests			2,742.90	2,667.90	75.00
Fighting and preventing forest fires in emergency			1,000,000.00	37,576.34	962,423.66
Total for Forest Service			6,628,699.14	4,959,626.92	1,669,072.22

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
Salaries, Department of Agriculture (not including Weather Bureau)			$4,149,410.00	$4,036,797.57	$112,612.43
Officers and clerks	$4,133,210			4,023,768.25	109,441.75
Extra labor	16,200			13,029.32	3,170.68
Contingent expenses, Department of Agriculture			110,000.00	88,565.09	21,434.91
Library, Department of Agriculture			15,500.00	12,658.66	2,841.34
Enforcement of the insecticide act			87,000.00	33,191.31	53,808.69
National Forest Reservation Commission			25,000.00	125.25	24,874.75
Acquisition of lands for protection of watersheds of navigable streams			2,000,000.00	101,106.03	1,898,893.97
Cooperative fire protection of forested watersheds of navigable streams			200,000.00	46,627.53	153,372.47
BUREAU OF ANIMAL INDUSTRY.					
General expenses, Bureau of Animal Industry			1,192,300.00	1,052,006.70	140,293.30
Inspection and quarantine	592,700	$602,700.00 GI		538,713.21	63,986.79
Eradicating cattle ticks	250,000	240,000.00 GI		215,921.68	24,078.32
Dairy industry	150,000	148,675.00 U		123,149.52	25,525.48
Animal husbandry	47,480	46,155.00 U		38,412.37	7,742.63
Diseases of animals	78,680			65,083.06	13,596.94
Experimental farm at Beltsville	10,000	11,000.00 U		9,859.68	1,140.32
Construction of buildings at Bethesda and Beltsville	16,500	18,150.00 U		16,856.27	1,293.73
Administrative expenses	46,940			44,010.91	2,929.09
Cooperative experiments in animal feeding and breeding			50,000.00	40,729.10	9,270.90
Meat inspection, Bureau of Animal Industry (permanent appropriation)			3,000,000.00	2,719,481.52	280,518.48
General expenses, Bureau of Animal Industry, 1911–12 (appropriated $65,000), balance available July 1, 1911			64,989.15	47,371.42	17,617.73
BUREAU OF PLANT INDUSTRY.					
General expenses, Bureau of Plant Industry, 1912			1,441,536.00	1,227,805.43	213,730.57
Pathological laboratory	22,930	22,855.00 CTIIKI		20,555.02	2,299.98
Fruit diseases	42,075	39,825.00 EMNAIJIKI		31,841.87	7,983.13
Forest pathology	24,670	27,110.00 ADFM		24,621.38	2,488.62
Cotton and truck diseases	24,860			20,877.56	3,982.44
Crop physiology	33,015	36,315.00 V		30,933.40	5,381.60
Bacteriology and nutrition	26,145	26,095.00 NI		21,048.87	5,046.13
Crop acclimatization	34,670			31,905.52	2,764.48
Drug and other plants	46,930	46,255.00 TOI		40,024.97	6,230.03
Crop technology	10,610	11,671.00 K		10,199.38	1,471.62
Cotton standardization	32,350	29,115.00 KORV		21,956.21	7,158.79
Grain standardization	57,080	XPI		50,190.02	6,889.98
Physical investigations	16,375	164323.00 PI		13,409.45	2,713.55
Specialseeds and plants	13,110	14,116.00 GW		12,428.48	1,687.52
Seed-testing laboratories	26,650	27,470.00 PXBIPI		24,256.61	3,213.39
Grain investigations	77,925	78,244.00 FLUY		70,877.64	7,366.36
Tobacco investigations	26,630	28,180.00 BZ		23,514.61	4,665.39

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
BUREAU OF PLANT INDUSTRY—continued.					
General expenses, Bureau of Plant Industry, 1912—Continued.					
Forage-crop investigations	$20,000			$12,473.96	$7,526.04
Paper-plant investigations	8,000	$8,800.00 O		7,520.64	1,279.36
Alkali and drought resistant plants	18,140			13,846.18	4,293.82
Sugar-plant investigations	32,355	31,515.00 A		26,870.07	4,644.93
Taxonomic and range investigations	21,930	20,430.00 DI		18,483.90	1,946.10
Farm management	138,920			122,735.52	16,184.48
Agricultural reconnoissance work in Alaska	4,000			3,302.88	697.12
Farmers' cooperative demonstration work	350,000	345,105.00 ABDLV		300,752.67	44,352.33
Dry-land agriculture	70,000	69,200.00 BI		46,458.97	22,741.03
Western agricultural extension	73,060	73,540.00 A		65,462.34	8,077.66
Pomological investigations	87,735	88,231.00 EY		73,413.78	14,817.22
Experimental gardens and grounds	13,860	15,060.00 C		13,362.87	1,697.13
Arlington farm and horticulture	38,000	39,152.00 RZNIOI		31,746.36	7,405.64
South Texas garden	11,260	10,134.00 G		8,436.96	1,697.04
Administrative and miscellaneous	38,251	39,125.00 PVWAIDI		34,297.34	4,827.66
Purchase and distribution of valuable seeds			$289,680.00	270,218.29	19,461.71
Congressional seed distribution	237,160			224,370.95	12,789.05
Foreign seed and plant introduction	52,520			45,847.34	6,672.66
Investigating the chestnut tree bark disease, 1911-12 (appropriated $5,000), balance available July 1, 1911			4,187.69	3,815.09	372.60
BUREAU OF CHEMISTRY.					
General expenses, Bureau of Chemistry			111,480.00	91,823.70	19,656.30
Laboratory, miscellaneous expenses	36,000			20,233.86	15,766.14
Laboratory, salaries and rent	71,200			67,757.66	3,442.34
Laboratory, American food products	4,280			3,832.18	447.82
Enforcement of the food and drugs act			535,110.00	447,205.75	87,904.25
Allotted to Referee Board: Enforcement of the food and drugs act			75,000.00	45,208.27	29,791.73
BUREAU OF SOILS.					
General expenses, Bureau of Soils			211,240.00	193,021.75	18,218.25
Soil laboratory investigations	51,600	51,850.00 HI		50,865.99	984.01
Investigations of fertilizer resources	10,000	CIMI		9,181.00	819.00
Soil survey	145,000	144,290.00 CIHIMI		129,445.66	14,844.34
Administrative expenses	4,640	5,100.00 HI		3,529.10	1,570.90
General expenses, Bureau of Soils, 1911-12 (appropriated $2,500), balance available July 1, 1911			655.13	424.64	230.49

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
BUREAU OF ENTOMOLOGY.					
General expenses, Bureau of Entomology			$246,950.00	$222,768.33	$24,181.67
Deciduous-fruit insects.	$39,700	$41,200.00 H		36,198.41	5,001.59
Cereal and forage insects	40,000			36,477.59	3,522.41
Southern field crop insects	47,160			41,230.24	5,929.76
Forest insects	44,750	43,250.00 H		38,330.48	4,919.52
Truck crop and stored product insects	19,100			17,472.27	1,627.73
Bee culture	15,000			14,733.99	266.01
Citrus-fruit insects	21,500			19,969.59	1,530.41
Miscellaneous insects	19,740			18,355.76	1,384.24
Preventing spread of moths, Bureau of Entomology			284,840.00	243,491.17	41,348.83
General expense, Bureau of Entomology, 1911–12 (appropriated $10,000), balance available July 1, 1911			5,210.42	4,961.73	248.69
BUREAU OF BIOLOGICAL SURVEY.					
General expenses, Bureau of Biological Survey			95,700.00	71,437.31	24,262.69
Game preservation	12,000			8,026.28	3,973.72
Maintenance of mammal and bird reservations	12,000			6,349.85	5,650.15
Game for national reservations	2,500			30.00	2,470.00
Food habits of birds and mammals	35,000			28,468.33	6,531.67
Biological investigations	20,000			17,173.57	2,826.43
Administrative expenses	14,200			11,389.28	2,810.72
Protection and removal of elk in Wyoming (appropriated $20,000), balance available July 1, 1911			19,004.62	8,775.41	10,229.21
DIVISION OF PUBLICATIONS.					
General expenses, Division of Publications[1]			30,000.00	21,813.55	8,186.45
Rent in Washington	5,000			4,583.33	416.67
Labor-saving machinery, etc	3,000			2,067.43	932.57
Stationery and materials	11,500			7,753.17	3,746.83
Furniture and fixtures.	1,000			717.77	282.23
Photographic equipment	5,000			4,856.89	143.11
Gas, electricity, etc	500			421.03	78.97
Wagons, horses, etc	1,000			280.49	719.51
Miscellaneous expenses	3,000			1,133.34	1,866.56
BUREAU OF STATISTICS.					
General expenses, Bureau of Statistics			122,900.00	97,653.54	25,246.46
Administrative expenses	24,700	24,950.00 SJ[1]		21,780.97	3,169.03
Special field agents	63,500	61,750.00 SJ[1]		51,617.15	10,132.85
State statistical agents.	32,200	33,700.00 S		22,487.42	11,212.58
Special investigations	2,500			1,768.00	732.00

[1] Congress also appropriated in the sundry civil bill for printing and binding, $470,000.

Appropriations, disbursements, and unexpended balances for the fiscal year 1912—Contd.

Object.	Subappropriation.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
OFFICE OF EXPERIMENT STATIONS.					
Agricultural experiment stations ($1,592,500) [1]			$152,500.00	$146,446.17	$6,053.83
Agricultural experiment stations	$37,500	$37,000.00 L[1]		34,124.20	2,875.80
Farmers' institutes	10,000			8,666.49	1,333.51
Station at Alaska	30,000	30,500.00 L[1]		30,000.00	500.00
Station at Hawaii	30,000			29,533.20	466.80
Station at Porto Rico	30,000			30,000.00	
Station at island of Guam	15,000			14,122.28	877.72
Nutrition investigations			15,000.00	14,130.68	869.32
Irrigation investigations			100,000.00	77,644.04	22,355.96
Drainage investigations			100,000.00	74,526.54	25,473.46
OFFICE OF PUBLIC ROADS.					
General expenses, Office of Public Roads			126,700.00	108,878.39	17,821.61
Road management	20,000			16,007.91	3,992.09
Investigating road building and maintenance	60,000	54,000.00 IJ		46,977.83	7,022.17
Road material	25,000	23,830.00 E[1]		21,811.90	2,018.10
Field experiments	10,000	16,000.00 IJ		15,270.02	729.98
Administrative expenses	11,700	12,870.00 E[1]		8,810.73	4,059.27
Total for main department exclusive of Weather Bureau and Forest Service			14,861,893.01	11,550,709.96	3,311,183.05
WEATHER BUREAU.					
Salaries, Weather Bureau			313,170.00	301,311.31	11,858.69
Contingent expenses, Weather Bureau			25,000.00	20,941.88	4,058.12
General expenses, Weather Bureau			1,262,080.00	940,403.73	321,676.27
Station salaries	546,580			501,978.19	44,601.81
Miscellaneous expenses	104,000	114,400.00		83,616.05	30,783.95
Instruments, etc	35,000	38,500.00		29,826.94	8,673.06
Key West building	15,000			1,895.00	13,105.00
Rents and repairs	97,500	96,000.00		69,072.82	26,927.18
Traveling expenses	22,000			15,914.81	6,085.19
Telephoning and telegraphing	300,000	298,100.00		148,503.10	149,596.90
Line and cable repairs	4,000			2,601.29	1,398.71
Investigations and substations	120,000	108,000.00		73,136.53	34,863.47
Printing office	18,000	19,500.00		13,859.00	5,641.00
Total for Weather Bureau			1,600,250.00	1,262,656.92	337,593.08
Total, exclusive of Forest Service			16,462,143.01	12,813,366.88	3,648,776.13
Total for Forest Service			6,628,699.14	4,959,626.92	1,669,072.22
Grand total			23,090,842.15	17,772,993.80	5,317,848.35

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[1] This includes $1,440,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department.

MONTHLY CHECK STATEMENTS.

The check statements submitted by the Treasury and subtreasuries were compared with the checks issued by this division and the amounts verified.

ANNUAL SUPPLIES.

Awards for all ordinary annual supplies for the use of this department during the fiscal year 1912 were made by the General Supply Committee of the Executive Departments, and it was therefore necessary for the Department of Agriculture to advertise independently for only those supplies of a technical character which are used by this department exclusively, and which, for that reason, were designedly omitted from the general schedule. The awards made for these technical supplies were, as heretofore, based upon bids received through advertisement in the columns of the daily newspapers in the large cities and special mail notifications to all of the well-known dealers in the wares required, the bids, when received, being submitted to and passed upon by a board of award acting under the instructions and by the authority of the Secretary. Although supplies aggregating an amount less than $50 may, under the act of March 1, 1899, be purchased in the open market, all supplies, as far as practicable, were regularly advertised for either directly by the department or through the General Supply Committee.

PUBLIC MONEYS RECEIVED FROM VARIOUS SOURCES.

There were received from various sources and deposited in the Treasury to the credit of the proper funds the following sums:

Miscellaneous receipts, sales of condemned property, etc	$25, 758. 66
Sales of products, agricultural station, Hawaii	459. 35
Sales of products, agricultural station, Porto Rico	4, 927. 80
Sales of products, agricultural station, Alaska	2, 882. 47
Sales of products, agricultural station, Guam	20. 00
Total	34, 048. 28

In this connection it is thought desirable to explain the method pursued in receiving and disposing of the moneys pertaining to the several funds.

The proceeds of "condemned property," "library index cards," and "card index of agricultural literature" prepared by the Office of Experiment Stations are covered into the Treasury to the credit of "Miscellaneous receipts," under section 3618 of the Revised Statutes.

Moneys derived from the sales of products at the insular stations in Hawaii, Porto Rico, Alaska, and Guam are used for the maintenance of those stations.

Up to June 30, 1907, the moneys derived from the sales of "publications" issued by the Weather Bureau were deposited in the Treasury to the credit of the appropriation "General expenses" of that bureau, under section 227 of the Revised Statutes. Since July 1, 1907, these moneys have been deposited to "Miscellaneous receipts," in accordance with the provision in the act making appropriations for this department for the fiscal year ending June 30, 1908. (34 Stat. L., 1258.)

"Seacoast telegraph line receipts" are covered into the Treasury under act of March 3, 1883. (22 Stat. L., 616.)

In acknowledgment of each deposit of funds the Treasurer issues to the depositor a duplicate certificate of deposit. The number of this certificate is entered as part of the transaction, and the certificate is filed in this division.

These moneys are forwarded to the Division of Accounts and Disbursements from the various bureaus, divisions, and offices of the department, accompanied by a letter or specially printed form, in duplicate, explaining whence the money was derived. The duplicate is receipted by the chief of this division and returned to the sender. The original is placed in the files of this division as a voucher. The amount received is entered in a book, with a description of the transaction copied from the letter of transmittal. If in the form of cash or postal money order, it is so stated in the entry, and if by check or draft a minute description is given, with name of payer, payee, indorser, name of bank, number and date of check, etc. The law requires that money so received shall be deposited in the Treasury within 30 days after its receipt by a Government officer. The practice in this office is to deposit all sums as soon as practicable after they are received unless of an insignificant amount. The chief of this division, having no authority to do otherwise, accepts the statements accompanying sums of money submitted to him, assuming them to be in strict accordance with the facts.

ACCOUNTS FOR THE FISCAL YEAR 1910 FINALLY CLOSED.

As required by section 5, legislative act, approved June 20, 1874 (18 Stat. L., 110–111), the unexpended balances of the appropriations for the year 1910 were finally covered into the Treasury on June 30, 1912, and carried to the surplus fund, as follows:

Amount of unexpended balances for fiscal year 1910 turned into the Treasury.

Object.	Subappropriations.	Transfer of funds.[1]	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
Salaries, Department of Agriculture (not including Weather Bureau)			$1,126,560.00	$1,104,123.54	$22,436.46
Officers and clerks	$1,118,960			1,096,824.50	22,135.50
Extra labor	7,600			7,299.04	300.96
Contingent expenses, Department of Agriculture			80,000.00	79,369.61	630.39
Library, Department of Agriculture			16,500.00	16,492.31	7.69
Paper tests, 1910			10,000.00	9,998.32	1.68
Allotted to Bureau of Plant Industry	5,000	439.25 F		439.25	
Allotted to Forest Service	5,000	9,560.75 F		9,559.07	1.68
Buildings, Department of Agriculture ($1,500,000), balance available July 1, 1909			1,251.10	1,251.10	
Paper tests ($10,000), balance available July 1, 1909			2,527.48	2,527.48	

[1] And not to exceed 10 per cent of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided for shall be available interchangeably for expenditure on the objects included within the general expenses of such bureau, division, or office, but no more than 10 per cent shall be added to any one item of appropriation except in cases of extraordinary emergency, and then only upon the written order of the Secretary of Agriculture.

Amount of unexpended balances for fiscal year 1910 turned into the Treasury—Continued.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
BUREAU OF ANIMAL INDUSTRY.					
General expenses, Bureau of Animal Industry			$1,263,760.00	$1,179,385.77	$84,374.23
Inspection and quarantine	$625,000			598,365.96	26,634.04
Eradicating cattle ticks	250,000			243,886.17	6,113.83
Dairy industry	149,000			124,002.18	24,997.82
Animal husbandry	43,000			33,560.97	9,439.03
Diseases of animals	109,000			101,865.30	7,134.70
Purchase of land for experiment station	25,000			25,000.00	
Administrative expenses	62,760			52,705.19	10,054.81
Cooperative experiments in animal feeding and breeding			50,000.00	45,885.73	4,114.27
Meat inspection, Bureau of Animal Industry (permanent appropriation)			3,000,000.00	2,936,177.86	63,822.14
BUREAU OF PLANT INDUSTRY.					
General expenses, Bureau of Plant Industry, 1909-1910 (appropriated $50,000), balance available July 1, 1909			32,633.53	32,524.10	109.43
General expenses, Bureau of Plant Industry, 1910			1,130,796.00	1,089,423.42	41,372.58
Pathological laboratory	22,470			22,258.11	211.89
Fruit diseases	34,700			33,403.64	1,296.36
Forest pathology	17,340	$16,540.00 A		16,334.77	205.23
Cotton and truck diseases	13,060			12,885.55	174.45
Crop physiology	27,290	26,025.00 CM		25,832.06	192.94
Bacteriology and nutrition	25,070			22,453.35	2,616.65
Crop acclimatization	17,990			17,882.66	107.34
Drug and other plants	43,420	43,820.00 B		42,913.08	906.92
Crop technology	13,030			12,620.60	409.40
Cotton standardization	12,250			11,325.13	924.87
Grain standardization	52,440			51,785.53	654.47
Physical investigations	15,510			15,421.63	88.37
Special seeds and plants	11,550			11,135.58	414.42
Seed-testing laboratories	25,840	26,040.00 Q		25,865.53	174.47
Grain investigations	63,910	64,830.00 AR		64,570.05	259.95
Tobacco investigations	23,180			20,297.82	2,882.18
Cotton breeding	18,130	16,730.00 B		16,556.76	173.24
General plant breeding	14,840			12,682.87	2,157.13
Paper-plant investigations	10,000			9,510.93	489.07
Alkali and drought resistant plants	17,550			17,162.68	387.32
Sugar-plant investigations	24,300			24,279.71	20.29
Taxonomic and range investigations	18,250			18,021.38	228.62
Farm management	133,000	132,270.00 PQ		118,347.23	13,922.77
Farmers' cooperative demonstration work	175,000			17,114.72	3,885.28
Dry-land agriculture	31,760			29,347.75	2,412.25
Western agricultural extension	76,680			75,432.12	1,247.88
Pomological investigations	71,360	72,625.00 CM		69,626.06	2,998.94
Experimental gardens and grounds	19,230	21,153.00 DU		21,091.54	61.46
Arlington farm and horticulture	38,470	37,200.00 DP		37,097.84	102.16
Florida subtropical garden	5,100			5,050.18	49.82
South Texas garden	9,100			9,071.67	28.33
Administrative and miscellaneous	48,976	48,733.00 RU		47,044.89	1,688.11

Amount of unexpended balances for fiscal year 1910 turned into the Treasury—Continued.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
BUREAU OF PLANT INDUSTRY—continued.					
Purchase and distribution of valuable seeds			$317,960.00	$315,302.63	$2,657.37
Congressional seed distribution	$262,320			260,385.78	1,934.22
Forage crop investigations	10,000			9,556.08	443.92
Foreign seed and plant introduction	45,640			45,360.77	279.23
BUREAU OF CHEMISTRY.					
General expenses, Bureau of Chemistry (deficiency act Feb. 25, 1910, $50,000)			855,000.00	792,772.71	62,227.29
Laboratory, miscellaneous expenses	30,000			29,105.25	894.75
Laboratory, transportation	6,300			4,114.10	2,185.90
Laboratory, salaries and rent	76,240			66,975.04	9,264.96
Laboratory, American food products	5,000			4,968.75	31.25
Food and drugs act, salaries in Washington	200,000	$185,000.00 G		169,700.43	15,299.57
Food and drugs act, salaries out of Washington ($266,460)	226,460	GN		221,692.31	4,767.69
Food and drugs act, miscellaneous expenses ($136,000)	120,000			116,414.67	3,585.33
Miscellaneous expenses, deficiency act	27,000			19,543.27	7,456.73
Food and drugs act, transportation ($85,000)	81,000			67,611.42	13,388.58
Witness fees, deficiency act	23,000			21,565.97	1,434.03
Allotted to Referee Board:					
Food and drugs act, salaries out of Washington	40,000	54,000.00 NV		53,155.81	844.19
Food and drugs act, miscellaneous expenses	16,000	17,000.00 V		16,126.68	873.32
Food and drugs act, transportation	4,000			1,799.01	2,200.99
BUREAU OF SOILS.					
General expenses, Bureau of soils			197,360.00	196,482.95	877.05
Soil laboratory investigations	48,000	48,500.00 J		48,380.39	119.61
Soil-water investigations	5,000	4,500.00 J		4,302.58	197.42
Soil survey	137,360			136,852.52	507.68
Administrative expenses	7,000			6,947.66	52.34
BUREAU OF ENTOMOLOGY.					
General expenses, Bureau of Entomology			198,400.00	188,765.42	9,634.58
Deciduous fruit insects	46,600	43,600.00 E		40,114.53	3,485.47
Cereal and forage insects	21,000	22,500.00 E		22,093.38	406.62
Southern field crop insects	42,000			40,807.00	1,193.00
Forest insects	12,000	13,500.00 E		13,400.64	99.36
Truck crop and stored product insects	16,250			15,913.49	336.51
Bee culture	10,000			9,858.85	141.15
Citrus fruit insects	16,500			15,315.75	1,184.25
Miscellaneous insects	34,050			31,261.78	2,788.22
Preventing spread of moths, Bureau of Entomology			300,000.00	268,194.44	31,805.56

Amount of unexpended balances for fiscal year 1910 turned into the Treasury—Continued.

Object.	Subappropriations.	Transfer of funds.[1]	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
BUREAU OF BIOLOGICAL SURVEY.					
General expenses, Bureau of Biological Survey			$74,420.00	$70,629.84	$3,790.16
Game preservation	$9,420			8,315.92	1,104.08
Maintenance of mammal and bird reservations	7,000			6,311.15	688.85
Food habits of birds and mammals	25,000			23,717.67	1,282.33
Biological investigations	18,000			17,420.50	579.50
Administrative expenses	15,000			14,864.60	135.40
DIVISION OF PUBLICATIONS.					
General expenses, Division of Publications[1]			33,000.00	32,369.78	630.22
Rent in Washington	5,000			5,000.00	
Labor-saving machinery, etc	5,000			4,971.10	28.90
Stationery and materials	11,500	$12,511.48 WT		12,511.48	
Furniture and fixtures	1,000			977.54	22.46
Photographic equipment	5,000			4,959.96	40.04
Gas, electricity, etc	1,500	1,488.52 T		1,223.09	265.43
Wagons, horses, etc	1,000	1,075.00 S		998.53	76.47
Miscellaneous expenses	3,000	1,925.00 WS		1,728.08	196.92
BUREAU OF STATISTICS.					
General expenses, Bureau of Statistics			117,060.00	111,331.47	5,728.53
Administrative expenses	25,860	23,360.00 K		22,609.08	750.92
Special field agents	56,000			53,452.63	2,547.37
State statistical agents	30,200	32,700.00 K		30,640.49	2,059.51
Special investigations	2,500			2,170.82	329.18
Cost production, farm products	2,500			2,458.45	41.55
OFFICE OF EXPERIMENT STATIONS.					
Agricultural experiment stations ($863,800)[2]			143,800.00	140,248.13	3,551.87
Agricultural experiment stations	34,800			34,060.88	739.12
Farmers' institutes	10,000			9,814.67	185.33
Station at Alaska	28,000			27,576.44	423.56
Station at Hawaii	28,000			27,994.03	5.97
Station at Porto Rico	28,000			27,987.19	12.81
Station at island of Guam	15,000			14,991.25	8.75
Nutrition investigations			10,000.00	9,873.58	126.42
Irrigation investigations			75,000.00	73,348.00	1,652.00
Drainage investigations			81,160.00	76,682.94	4,477.06
OFFICE OF PUBLIC ROADS.					
General expenses, Office of Public Roads			100,000.00	99,266.42	733.58
Road management	18,000			17,972.20	27.80
Investigating road building and maintenance	34,000			33,871.27	128.73
Road material	25,000			24,637.85	362.15
Reports of investigations	23,000			22,785.10	214.90
Total for main department exclusive of Weather Bureau and Forest Service			9,217,188.11	8,872,427.55	344,760.56

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[1] Congress also appropriated in the sundry civil bill for printing and binding, $460,000.

[2] This includes $720,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department. Congress also appropriated $624,000 as a permanent appropriation for State experiment stations under the Adams bill, to be paid through the Treasury Department. Total to be paid through the Treasury Department for State experiment stations, $1,344,000.

Amount of unexpended balances for fiscal year 1910 turned into the Treasury—Continued.

Object.	Subappropriations.	Transfer of funds.	Total amount appropriated.	Amount disbursed.	Balance of appropriation on hand.
WEATHER BUREAU.					
Salaries, Weather Bureau			$205,310.00	$204,633.91	$676.09
Contingent expenses, Weather Bureau			25,000.00	24,813.74	186.26
General expenses, Weather Bureau			1,277,950.00	1,261,047.80	16,902.20
Station salaries	$620,750			617,096.31	3,653.69
Miscellaneous expenses	91,000	$91,500.00 O		90,212.49	1,287.51
Instruments, etc	30,000	31,900.00 LO		31,413.28	486.72
Rents and repairs	80,000	83,500.00 IL		83,353.18	146.82
Traveling expenses	22,000	20,000.00 L		19,211.96	788.04
Telephoning and telegraphing	260,000	269,000.00 HI		261,789.21	7,210.79
Line and cable repairs	4,200	3,800.00 H		3,488.59	311.41
Investigations and substations	125,000	112,500.00 IO		109,632.36	2,867.64
Printing office	45,000			44,850.42	149.58
Total for Weather Bureau			1,508,260.00	1,490,495.45	17,764.55
FOREST SERVICE.					
General expenses, Forest Service			3,986,000.00	3,940,485.02	45,514.98
Improvement of the national forests			600,000.00	597,211.82	2,788.18
National Bison Range (appropriated $43,000), balance available July 1, 1909 (deficiency act Feb. 25, 1910, $7,700)			50,480.40	50,480.40	
Naval stores industry ($10,000), balance available July 1, 1909			1,050.68	1,050.68	
Total for (regular) Forest Service			4,637,531.08	4,589,227.92	48,303.16
Total of all regular and special appropriations for entire department			15,362,979.19	14,952,150.92	410,828.27
Payment to States and Territories, national forest funds			506,194.83	506,194.83	
Refunds to depositors, excess of deposits			48,966.86	48,966.86	
Cooperative work, forest investigations			40,670.39	40,670.39	
Grand total			15,958,811.27	15,547,983.00	410,828.27

BUILDINGS RENTED IN THE DISTRICT OF COLUMBIA.

The following statement shows the buildings under rent in the District of Columbia on June 30, 1912.

Buildings rented in the District of Columbia.

Location of buildings.	For what purpose used.	Annual rental.
No. 1362 B street SW	Bureau of Animal Industry, offices	$1,800.00
Nos. 1224-1226 B Street SW	Bureau of Animal Industry, offices and storage purposes.	720.00
Rooms 914 and 915, Munsey Building	Bureau of Animal Industry, offices	420.00
Rear of 1228 C Street SW	Bureau of Animal Industry, stable	144.00
Atlantic Building	Forest Service, offices	24,805.00
No. 913 E Street NW	Forest Service, carpenter shop	270.00
No. 215 Thirteenth Street SW	Division of Publications, document rooms	5,000.00
No. 201 Thirteenth Street SW	Bureau of Plant Industry, offices and laboratories	360.00
No. 203 Thirteenth Street SW	do	420.00
No. 205 Thirteenth Street SW	do	420.00
No. 207 Thirteenth Street SW	do	420.00
No. 207½ Thirteenth Street SW	do	420.00
No. 209 Thirteenth Street SW	do	420.00
No. 224 Twelfth Street SW	do	2,500.00
Nos. 1304-1306 B Street SW	Bureau of Plant Industry, offices, laboratories, and storage rooms.	2,500.00
Nos. 1308-1310 B Street SW	do	360.00
Nos. 221-223 Linwood Place SW	Bureau of Plant Industry, seed building	4,800.00
No. 1358 B Street SW	Bureau of Plant Industry, offices	750.00
No. 1360 B Street SW	do	420.00
Portion of 210-212 Fourteenth Street SW.	Bureau of Plant Industry, storage	144.00
No. 217 Seventh Street SW	Bureau of Plant Industry, offices	[1] 360.00
No. 209½ Thirteenth Street SW	do	[2] 141.00
No. 1354 B Street SW	Bureau of Plant Industry and Insecticide Board	[3] 281.25
No. 219 Thirteenth Street SW	Bureau of Soils, storage	[4] 229.50
No. 212 Thirteenth Street SW	Bureau of Chemistry, offices and laboratories	660.00
No. 214 Thirteenth Street SW	do	660.00
No. 216 Thirteenth Street SW	do	16,000.00
Nos. 200-202 Fourteenth Street SW	Office of Public Roads, offices and laboratories	3,500.00
No. 1316 B Street SW	Office of the Solicitor, offices	2,160.00
No. 215 Twelfth Street SW	Office of Experiment Stations, offices	720.00
Total		71,804.75

[1] For a period of 6 months, at the rate of $60 per month, $360.
[2] For a period of 6 months, at the rate of $23.50 per month, $141.
[3] For a period of 7½ months, at the rate of $37.50 per month, $281.25.
[4] For a period of 9 months, at the rate of $25.50 per month, $229.50.

ESTIMATES OF APPROPRIATIONS.

The estimates of appropriations for the year ended June 30, 1912, were prepared in this division, based upon recommendations made by the chiefs of the several bureaus and divisions, and after receiving the approval of the Secretary were forwarded to the Treasury in accordance with statutory requirements.

APPROPRIATIONS AND ESTIMATES FOR 1913.

Estimates for 1913.

Salaries, Department of Agriculture, Office of the Secretary		$294,110
Officers and clerks	$273,100	
Supplemental estimate	6,810	
Extra labor	14,200	

WEATHER BUREAU.

Salaries, Weather Bureau		$317,120
Contingent expenses, Weather Bureau		25,000
General expenses, Weather Bureau		1,268,330
Station salaries	$564,080	
Miscellaneous expenses	106,000	
Instruments, etc	36,000	
Rents and repairs	97,500	
Traveling expenses	22,000	
Telephoning and telegraphing	302,000	
Line and cable repairs	4,000	
Investigations and substations	120,000	
Printing office	16,750	

BUREAU OF ANIMAL INDUSTRY.

Salaries		360,430
General expenses, Bureau of Animal Industry		1,229,666
Inspection and quarantine	$611,800	
Eradicating cattle ticks	250,000	
Dairy industry	177,900	
Animal husbandry	52,180	
Diseases of animals	78,680	
Experimental farm	16,500	
Administrative expenses	42,606	
Cooperative experiments in animal feeding and breeding		55,000

BUREAU OF PLANT INDUSTRY.

Salaries		374,790
General expenses, Bureau of Plant Industry		1,438,590
Pathological laboratory	$29,500	
Fruit diseases	40,675	
Forest pathology	29,510	
Cotton and truck diseases	24,140	
Crop physiology	30,380	
Bacteriology and nutrition	26,145	
Crop acclimatization	33,290	
Drug and other plants	46,930	
Crop technology	10,010	
Cotton standardization	28,180	
Grain standardization	55,640	
Physical investigations	15,655	
Special seeds and plants	13,110	
Seed testing laboratories	23,530	
Grain investigations	75,765	
Tobacco investigations	26,630	
Forage crop investigations	20,000	
Paper plant investigations	7,580	
Alkali and drought resistant plants	18,140	
Sugar plant investigations	30,795	
Taxonomic and range investigations	21,930	
Farm management	186,020	
Farmers' cooperative demonstration work	332,960	
Dry-land agriculture	70,000	
Western agricultural extension	69,600	
Pomological investigations	86,015	
Experimental gardens and grounds	13,010	
Arlington farm and horticulture	36,920	
Administrative and miscellaneous	36,530	
Purchase and distribution of valuable seeds		285,680
Congressional seed distribution	226,940	
Foreign seed and plant introduction	58,740	

FOREST SERVICE.

Salaries		$2,290,610
General expenses, Forest Service		[1] 3,208,005
Use, maintenance, and protection of national forests—		
Absaroka National Forest	$8,213	
Alamo National Forest	6,535	
Angeles National Forest	13,577	
Apache National Forest	13,088	
Arapaho National Forest	14,758	
Arkansas National Forest	14,402	
Ashley National Forest	4,434	
Battlement National Forest	6,593	
Beartooth National Forest	11,889	
Beaverhead National Forest	9,769	
Bighorn National Forest	16,988	
Bitterroot National Forest	20,115	
Blackfeet National Forest	21,981	
Black Hills National Forest	9,128	
Boise National Forest	10,519	
Bonneville National Forest	3,993	
Bridger National Forest	3,638	
Cabinet National Forest	12,847	
Cache National Forest	7,703	
California National Forest	11,993	
Caribou National Forest	5,228	
Carson National Forest	17,291	
Cascade National Forest	12,179	
Challis National Forest	5,226	
Chelan National Forest	8,068	
Chiricahua National Forest	8,382	
Chugach National Forest	23,485	
Clearwater National Forest	15,827	
Cleveland National Forest	9,499	
Cochetopa National Forest	7,159	
Coconino National Forest	16,994	
Coeur d'Alene National Forest	15,239	
Colorado National Forest	8,734	
Columbia National Forest	13,867	
Colville National Forest	10,609	
Coronado National Forest	8,501	
Crater National Forest	25,059	
Crook National Forest	6,039	
Custer National Forest	8,358	
Dakota National Forest	1,232	
Datil National Forest	13,688	
Deerlodge National Forest	18,389	
Deschutes National Forest	11,406	
Dixie National Forest	3,990	
Durango National Forest	7,558	
Eldorado National Forest	11,213	
Fillmore National Forest	3,655	
Fishlake National Forest	3,510	
Flathead National Forest	27,116	
Florida National Forest	9,914	
Fremont National Forest	10,807	
Gallatin National Forest	6,873	
Gila National Forest	24,165	
Gunnison National Forest	10,952	
Harney National Forest	7,525	
Hayden National Forest	6,542	
Helena National Forest	7,467	
Holy Cross National Forest	7,017	
Humboldt National Forest	5,840	
Idaho National Forest	11,983	
Inyo National Forest	8,839	

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[1] Not to exceed 15 per cent available for general administration expenses.

General expenses, Forest Service—Continued.
Use, maintenance, and protection of national forests—Continued.

Jefferson National Forest	$11,394
Jemez National Forest	17,139
Kaibab National Forest	6,652
Kaniksu National Forest	25,027
Kansas National Forest	3,117
Kern National Forest	13,179
Klamath National Forest	27,857
Kootenai National Forest	30,846
La Sal National Forest	6,569
Lassen National Forest	18,659
Leadville National Forest	9,037
Lemhi National Forest	7,218
Lewis and Clark National Forest	12,286
Lincoln National Forest	5,617
Lolo National Forest	20,104
Luquillo National Forest	3,961
Madison National Forest	10,299
Malheur National Forest	10,398
Manti National Forest	7,808
Manzano National Forest	4,653
Marquette National Forest	2,863
Medicine Bow National Forest	17,429
Michigan National Forest	2,417
Minam National Forest	4,194
Minnesota National Forest	9,797
Minidoka National Forest	5,259
Missoula National Forest	15,776
Moapa National Forest	1,794
Modoc National Forest	10,950
Mono National Forest	5,803
Monterey National Forest	4,464
Montezuma National Forest	10,255
Nebo National Forest	1,654
Nebraska National Forest	4,231
Nevada National Forest	8,950
Nezperce National Forest	20,360
Ochoco National Forest	9,352
Okanogan National Forest	16,884
Olympic National Forest	16,850
Oregon National Forest	19,077
Ozark National Forest	15,893
Palisade National Forest	8,721
Paulina National Forest	13,670
Payette National Forest	12,454
Pecos National Forest	13,093
Pend Oreille National Forest	14,303
Pike National Forest	17,973
Plumas National Forest	23,608
Pocatello National Forest	1,483
Powell National Forest	2,586
Prescott National Forest	6,376
Rainier National Forest	13,518
Rio Grande National Forest	10,976
Routt National Forest	11,675
Ruby National Forest	3,583
St. Joe National Forest	27,624
Salmon National Forest	12,169
San Isabel National Forest	7,399
San Juan National Forest	9,901
Santa Barbara National Forest	12,270
Santa Rosa National Forest	8,400
Santiam National Forest	12,627
Sawtooth National Forest	7,278
Selway National Forest	20,265
Sequoia National Forest	15,821
Sevier National Forest	4,362

General expenses, Forest Service—Continued.		
Use, maintenance, and protection of national forests—Continued.		
Shasta National Forest	$24, 533	
Shoshone National Forest	6, 963	
Sierra National Forest	13, 049	
Sioux National Forest	6, 118	
Siskiyou National Forest	13, 234	
Sitgreaves National Forest	15, 310	
Siuslaw National Forest	7, 989	
Snoqualmie National Forest	25, 605	
Sopris National Forest	9, 047	
Stanislaus National Forest	18, 593	
Sundance National Forest	3, 711	
Superior National Forest	13, 099	
Tahoe National Forest	20, 177	
Targhee National Forest	12, 332	
Teton National Forest	8, 825	
Toiyabe National Forest	8, 922	
Tongass National Forest	21, 160	
Tonto National Forest	10, 429	
Trinity National Forest	29, 483	
Tusayan National Forest	11, 751	
Uinta National Forest	6, 744	
Umatilla National Forest	8, 217	
Umpqua National Forest	13, 076	
Uncompahgre National Forest	10, 099	
Wallowa National Forest	11, 407	
Wasatch National Forest	2, 183	
Washakie National Forest	5, 057	
Washington National Forest	12, 298	
Weiser National Forest	9, 186	
Wenaha National Forest	7, 441	
Wenatchee National Forest	8, 188	
White River National Forest	12, 112	
Whitman National Forest	16, 489	
Wichita National Forest	6, 436	
Wyoming National Forest	9, 995	
Zuni National Forest	3, 734	
Additional national forests to be created under sec. 11 of the act of Mar. 1, 1911 (36 Stat., 963)	32, 590	
Fighting forest fires	150, 000	
Maintenance and supplies	183, 580	
Forest products	176, 140	
National forest range investigations	25, 180	
Silviculture, national forests	186, 640	
Management of forests	83, 728	
Market and miscellaneous investigations	31, 360	
Improvement of the national forests	500, 000	

BUREAU OF CHEMISTRY.

Salaries		$262, 940
General expenses, Bureau of Chemistry		101, 280
Laboratory, miscellaneous expenses	$35, 300	
Laboratory, salaries and rent	61, 700	
Laboratory, American food products	4, 280	
Enforcement of the food and drugs act		650, 000

BUREAU OF SOILS.

Salaries		57, 330
General expenses, Bureau of Soils		284, 370
Chemical investigations	$24, 000	
Physical investigations	15, 000	
Soil-fertility investigations	27, 200	
Investigations of fertilizer resources	25, 000	
Soil-water investigations	5, 000	
Soil-survey investigations	183, 890	
Administrative expenses	4, 280	

BUREAU OF ENTOMOLOGY.

Salaries		$58,630
General expenses, Bureau of Entomology		258,450
Deciduous fruit insects	$40,600	
Cereal and forage insects	50,000	
Southern field crop insects	47,160	
Forest insects	44,750	
Truck crop and stored product insects	19,700	
Bee culture	15,000	
Citrous fruit insects	21,500	
Miscellaneous insects	19,740	
Preventing spread of moths, Bureau of Entomology		284,840

BUREAU OF BIOLOGICAL SURVEY.

Salaries		25,100
General expenses, Bureau of Biological Survey		108,300
Game preservation	$12,000	
Maintenance of mammal and bird reservations	20,000	
Food habits of birds and mammals	43,000	
Biological investigations	20,000	
Administrative expenses	13,300	

DIVISION OF ACCOUNTS AND DISBURSEMENTS.

Salaries	104,620
General expenses, Division of Accounts and Disbursements	10,000

DIVISION OF PUBLICATIONS.

Salaries		181,810
General expenses, Division of Publications		25,000
Labor-saving machinery, etc.,	$3,000	
Stationery and materials	11,500	
Furniture and fixtures	1,000	
Photographic equipment	5,000	
Gas, electricity, etc	500	
Wagons, horses, etc	1,000	
Miscellaneous expenses	3,000	

BUREAU OF STATISTICS.

Salaries		111,720
General expenses, Bureau of Statistics		128,300
Administrative expenses	$24,700	
Special field agents	68,900	
State statistical agents	32,200	
Special investigations	2,500	

LIBRARY.

Salaries	27,650
General expenses	15,500

OFFICE OF EXPERIMENT STATIONS.

Salaries		59,840
Agricultural Experiment Stations		1,604,160
Agricultural Experiment Stations, to be disbursed by the Treasury Department	$1,440,000	
Agricultural Experiment Stations	38,400	
Farmers' institutes	15,760	
Station at Alaska	30,000	
Station at Hawaii	30,000	
Station at Porto Rico	30,000	
Station at island of Guam	15,000	
Station at island of Tutuila	5,000	
Nutrition investigations		20,000
Irrigation investigations		98,300
Drainage investigations		96,700

OFFICE OF PUBLIC ROADS.

Salaries		$37,940
General expenses, Office of Public Roads		189,456
Road management	$28,836	
Investigating road building and maintenance	90,160	
Road material	30,360	
Field experiments	30,000	
Administrative expenses	10,100	

MISCELLANEOUS.

Contingent expenses, Department of Agriculture	96,066
Rent in the District of Columbia	95,329
Enforcement of the insecticide act	100,000
Emergency fire fighting	1,000,000
Grand total	17,240,262
Meat inspection, Bureau of Animal Industry (permanent appropriation)	3,000,000

Appropriated for 1913.

General expenses, Forest Service		$3,107,285.00
New forests	$32,590	
Fighting forest fires	150,000	
Agricultural-land classification	25,000	
Maintenance and supplies	155,000	
Survey, etc., of lands	35,000	
Forest products	170,000	
National forest range investigations	20,180	
Silviculture, national forests	165,640	
Management of forests	83,728	
Market and miscellaneous investigations	31,360	
Improvement of the national forests	400,000	
Absaroka National Forest	8,213	
Alamo National Forest	6,535	
Angeles National Forest	13,577	
Apache National Forest	13,088	
Arapaho National Forest	14,758	
Arkansas National Forest	14,402	
Ashley National Forest	4,434	
Battlement National Forest	6,593	
Beartooth National Forest	11,889	
Beaverhead National Forest	9,769	
Bighorn National Forest	16,988	
Bitterroot National Forest	20,115	
Blackfeet National Forest	21,981	
Black Hills National Forest	9,128	
Boise National Forest	10,519	
Bonneville National Forest	3,993	
Bridger National Forest	3,638	
Cabinet National Forest	12,847	
Cache National Forest	7,703	
California National Forest	11,993	
Caribou National Forest	5,228	
Carson National Forest	17,291	
Cascade National Forest	12,179	
Challis National Forest	5,226	
Chelan National Forest	8,068	
Chiricahua National Forest	8,382	
Chugach National Forest	23,485	
Clearwater National Forest	15,827	
Cleveland National Forest	9,499	
Cochetopa National Forest	7,159	
Coconino National Forest	16,994	
Coeur d'Alene National Forest	15,239	
Colorado National Forest	8,734	

General expenses, Forest Service—Continued.

Columbia National Forest	$13,867
Colville National Forest	10,609
Coronado National Forest	8,501
Crater National Forest	25,059
Crook National Forest	6,039
Custer National Forest	8,358
Dakota National Forest	1,232
Datil National Forest	13,688
Deerlodge National Forest	18,389
Deschutes National Forest	11,406
Dixie National Forest	3,990
Durango National Forest	7,558
Eldorado National Forest	11,213
Fillmore National Forest	3,655
Fishlake National Forest	3,510
Flathead National Forest	27,116
Florida National Forest	9,914
Fremont National Forest	10,807
Gallatin National Forest	6,873
Gila National Forest	24,165
Gunnison National Forest	10,952
Harney National Forest	7,525
Hayden National Forest	6,542
Helena National Forest	7,467
Holy Cross National Forest	7,017
Humboldt National Forest	5,840
Idaho National Forest	11,983
Inyo National Forest	8,839
Jefferson National Forest	11,394
Jemez National Forest	17,139
Kaibab National Forest	6,652
Kaniksu National Forest	25,027
Kansas National Forest	3,117
Kern National Forest	13,179
Klamath National Forest	27,857
Kootenai National Forest	30,846
La Sal National Forest	6,569
Lassen National Forest	18,659
Leadville National Forest	9,037
Lemhi National Forest	7,218
Lewis and Clark National Forest	12,286
Lincoln National Forest	5,617
Lolo National Forest	20,104
Loquillo National Forest	3,961
Madison National Forest	10,299
Malheur National Forest	10,398
Manti National Forest	7,808
Manzano National Forest	4,653
Marquette National Forest	2,863
Medicine Bow National Forest	17,429
Michigan National Forest	2,417
Minam National Forest	4,194
Minnesota National Forest	9,797
Minidoka National Forest	5,259
Missoula National Forest	15,776
Moapa National Forest	1,794
Modoc National Forest	10,950
Mono National Forest	5,803
Monterey National Forest	4,464
Montezuma National Forest	10,255
Nebo National Forest	1,654
Nebraska National Forest	4,231
Nevada National Forest	8,950
Nezperce National Forest	20,360
Ochoco National Forest	9,352
Okanogan National Forest	16,884

General expenses, Forest Service—Continued.

Olympic National Forest	$16,850
Oregon National Forest	19,077
Ozark National Forest	15,893
Palisade National Forest	8,721
Paulina National Forest	13,670
Payette National Forest	12,454
Pecos National Forest	13,093
Pend d'Oreille National Forest	14,303
Pike National Forest	17,973
Plumas National Forest	23,608
Pocatello National Forest	1,483
Powell National Forest	2,586
Prescott National Forest	6,376
Rainier National Forest	13,518
Rio Grande National Forest	10,976
Routt National Forest	11,675
Ruby National Forest	3,583
St. Joe National Forest	27,624
Salmon National Forest	12,169
San Isabel National Forest	7,399
San Juan National Forest	9,901
Santa Barbara National Forest	12,270
Santa Rosa National Forest	8,400
Santiam National Forest	12,627
Sawtooth National Forest	7,278
Selway National Forest	20,265
Sequoia National Forest	15,821
Sevier National Forest	4,362
Shasta National Forest	24,533
Shoshone National Forest	6,963
Sierra National Forest	13,049
Sioux National Forest	6,118
Siskiyou National Forest	13,234
Sitgreaves National Forest	15,310
Siuslaw National Forest	7,989
Snoqualmie National Forest	25,605
Sopris National Forest	9,047
Stanislaus National Forest	18,593
Sundance National Forest	3,711
Superior National Forest	13,099
Tahoe National Forest	20,177
Targhee National Forest	12,332
Teton National Forest	8,825
Toiyabe National Forest	8,922
Tongass National Forest	21,160
Tonto National Forest	10,429
Trinity National Forest	29,483
Tusayan National Forest	11,751
Uinta National Forest	6,744
Umatilla National Forest	8,217
Umpqua National Forest	13,076
Uncompahgre National Forest	10,099
Wallowa National Forest	11,407
Wasatch National Forest	2,183
Washakie National Forest	5,057
Washington National Forest	12,298
Weiser National Forest	9,186
Wenaha National Forest	7,441
Wenatchee National Forest	8,188
White River National Forest	12,112
Whitman National Forest	16,489
Wichita National Forest	6,436
Wyoming National Forest	9,995
Zuni National Forest	3,734

General administration, 15 per cent.

SPECIAL APPROPRIATIONS.

Refunds to depositors, excess of deposits, national forests fund		
Cooperative work, forest investigations		
National Bison Range		$602.59
Calaveras Big Tree National Forest acquisition		10,000.00
Reimbursement to temporary employees of Forest Service for time lost fighting fires on national forests		396.33
Reimbursement for horses, etc., lost fighting fires on national forests		75.00
Fighting and preventing forest fires in emergency		200,000.00
Total for Forest Service		3,318,358.92
Salaries, Department of Agriculture (not including Weather Bureau)		4,182,100.00
Officers and clerks	$4,170,100	
Extra labor	12,000	
Contingent expenses, Department of Agriculture		106,066.00
Library, Department of Agriculture		15,500.00
Enforcement of the insecticide act		87,000.00
Nursery-plant inspection and quarantine		25,000.00
National Forest Reservation Commission		25,000.00
Acquisition of lands for protection of watersheds of navigable streams (appropriated $2,000,000 and balance of $1,886,873.21, Aug. 10, 1912, brought forward from fiscal year 1912)		3,886,873.21
Cooperative fire protection of forested watersheds of navigable streams (appropriated $200,000, balance available July 1, 1912)		153,372.47
Rent of buildings, Department of Agriculture		95,329.00
International Dry Land Congress at Lethbridge, Canada		10,000.00
Investigating the chestnut tree bark disease		80,000.00
Bureau of Plant Industry	$70,000	
Bureau of Entomology	10,000	

BUREAU OF ANIMAL INDUSTRY.

General expenses, Bureau of Animal Industry		1,217,866.00
Inspection and quarantine	$600,000	
Eradicating cattle ticks	250,000	
Dairy industry	177,900	
Animal husbandry	52,180	
Diseases of animals	78,680	
Construction of buildings at Bethesda and Beltsville	16,500	
Administrative expenses	42,606	
Cooperative experiments in animal feeding and breeding		100,000.00
Meat inspection, Bureau of Animal Industry (permanent appropriation)		3,000,000.00

BUREAU OF PLANT INDUSTRY.

General expenses, Bureau of Plant Industry		1,658,080.00
Pathological laboratory	$25,000	
Fruit diseases	40,675	
Forest pathology	29,510	
Cotton and truck diseases	22,000	
Crop physiology	30,380	
Bacteriology and nutrition	26,145	
Crop acclimatization	33,300	
Drug and other plants	46,930	
Crop technology	10,010	
Cotton standardization	18,000	
Cotton-spinning machinery	8,000	
Grain standardization	55,640	
Physical investigations	15,655	
Special seeds and plants	12,430	
Drought-resistant seeds	40,000	
Seed-testing laboratories	23,530	
Cereal investigations	80,765	
Tobacco investigations	26,630	
Forage-crop investigations	20,000	

General expenses, Bureau of Plant Industry—Continued.		
Paper-plant investigations	$12,580	
Alkali and drought resistant plants	18,140	
Sugar-plant investigations	35,795	
Taxonomic and range investigations	21,930	
Farm management	290,000	
Utilization of cacti and dry-land plants	10,000	
Farmers' cooperative demonstrations	332,960	
Dry-land agriculture	75,000	
Northern Great Plains field station	50,000	
Clearing and utilization of "logged-off" lands	5,000	
Western irrigation agriculture	69,600	
Pomological investigations	86,015	
Experimental gardens and grounds	13,010	
Arlington farm and horticulture	36,920	
Administrative and miscellaneous	36,530	
Purchase and distribution of valuable seeds		$285,680.00
Congressional seed distribution	226,940	
Foreign seed and plant introduction	58,740	
Potatoes and sugar-beet seed under irrigation		10,000.00

BUREAU OF CHEMISTRY.

General expenses, Bureau of Chemistry		89,280.00
Laboratory, miscellaneous expenses	$30,000	
Laboratory, salaries and rent	55,000	
Laboratory, American food products	4,280	
Enforcement of the food and drugs act (appropriated $625,000)		550,000.00
Allotted to Referee Board:		
Enforcement of the food and drugs act		75,000.00

BUREAU OF SOILS.

General expenses, Bureau of Soils		250,880.00
Chemical investigations	$18,135	
Physical investigations	11,265	
Soil-fertility investigations	22,200	
Investigations of fertilizer resources	25,000	
Soil-water investigations	5,000	
Soil-survey investigations	165,000	
Administrative expenses	4,280	

BUREAU OF ENTOMOLOGY.

General expenses, Bureau of Entomology		328,750.00
Deciduous fruit insects	$40,600	
Cereal and forage insects	75,000	
Southern field crop insects	47,160	
Forest insects	44,750	
Truck crop and stored product insects	30,000	
Bee culture	15,000	
Citrus fruit insects	21,500	
Mediterranean fruit fly	35,000	
Miscellaneous insects	19,740	
Preventing spread of moths, Bureau of Entomology		284,840.00
Exterminating the army worm		5,000.00

BUREAU OF BIOLOGICAL SURVEY.

General expenses, Bureau of Biological Survey		95,300.00
Game preservation	$12,000	
Maintenance of mammal and bird reservations	14,500	
Game for national reservations	2,500	
Food habits of birds and mammals	40,000	
Exterminating ground squirrels on national forests in California	3,000	
Biological investigations	10,000	
Administrative expenses	13,300	

Protection and removal of elk in Wyoming (appropriated $20,000), balance available July 1, 1912		$10,229.21
Wind Cave National Game Preserve		26,000.00
Winter game elk reserve in Wyoming		45,000.00

DIVISION OF PUBLICATIONS.

General expenses, Division of Publications [1]		25,000.00
Labor-saving machinery, etc	$3,000	
Stationery and materials	11,500	
Furniture and fixtures	1,000	
Photographic equipment	5,000	
Communication and transportation service	500	
Wagons, horses, etc	1,000	
Miscellaneous expenses	3,000	

BUREAU OF STATISTICS.

General expenses, Bureau of Statistics		128,300.00
Administrative expenses	$24,700	
Special field agents	68,900	
State statistical agents	32,200	
Special investigations	2,500	

OFFICE OF EXPERIMENT STATIONS.

Agricultural experiment stations		1,599,160.00
Agricultural experiment stations (State colleges) [2]	$1,440,000	
Miscellaneous expenses	38,400	
Farmers' institutes	15,760	
Station at Alaska	30,000	
Station at Hawaii	30,000	
Station at Porto Rico	30,000	
Station at island of Guam	15,000	
Nutrition investigations		16,000.00
Irrigation investigations		98,300.00
Drainage investigations		100,000.00

OFFICE OF PUBLIC ROADS.

General expenses, Office of Public Roads		165,100.00
Road management	$25,000	
Investigating road building and maintenance	75,000	
Road material	25,000	
Field experiments	30,000	
Administrative expenses	10,100	
Improving roads for rural delivery service		500,000.00
Total for main department, exclusive of Weather Bureau and Forest Service		19,330,005.89

WEATHER BUREAU.

Salaries, Weather Bureau		315,930.00
Contingent expenses, Weather Bureau		25,000.00
General expenses, Weather Bureau		1,278,750.00
Station salaries	$569,000	
Miscellaneous expenses	105,500	
Instruments, etc	42,500	
Rents and repairs	99,000	
Traveling expenses	22,000	
Telephoning and telegraphing	305,000	

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[1] Congress also appropriated in the sundry civil bill for printing and binding $475,000.

[2] To be paid through the Treasury Department.

General expenses, Weather Bureau—Continued.		
Line and cable repairs	$4,000	
Investigations and substations	115,000	
Printing office	16,750	
Total for Weather Bureau		$1,619,680.00
Total (exclusive of "General expenses" for Forest Service)		20,949,685.89
Grand total for department		[1]124,268,044.81

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[1] And not to exceed 10 per cent of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided for shall be available interchangeably for expenditure on the objects included within the general expenses of such bureau, division, or office, but no more than 10 per cent shall be added to any one item of appropriation, except in cases of extraordinary emergency, and then only upon the written order of the Secretary of Agriculture.

FISCAL AFFAIRS OF THE FOREST SERVICE.

The following statement, furnished by the fiscal agents of the Forest Service, is printed:

Statement of the fiscal transactions of the Forest Service.

	District 1, Missoula.	District 2, Denver.	District 3, Albuquerque.	District 4, Ogden.	District 5, San Francisco.	District 6, Portland.	Washington and Madison.	Total.
Number of requisitions for purchase of supplies		132		2,255	57	144	2,581	5,169
Number of letters of authorization issued for travel	434	593	167	85	99	82	200	1,660
Number of accounts paid, including cooperative	8,410	9,051	7,413	9,365	9,747	10,431	4,180	58,597
Number of Appalachian accounts audited							1,078	1,078
Total amount paid from 1912 appropriations, including cooperations	$844,099.32	$673,511.93	$570,304.43	$780,491.10	$769,170.14	$858,341.81	$498,172.03	$4,994,090.76
Total amount paid from 1911 appropriations under waiver from Treasury.	$59,798.51	$83,666.69	$63,457.14	$115,536.20	$69,400.35	$83,462.08	$65,130.64	$540,451.61
Number of checks drawn	16,844	17,230	13,006	15,748	18,600	20,111	5,842	107,381
Number of passenger-transportation requests issued	1,071	1,070	1,370	975	722	1,310	2,500	9,018
Number of bills of lading issued for freight and express	1,263	997	681	2,083	968	903	107	7,002
Amount received from sale of condemned Government property, etc	$227.87	$339.40	$1,870.74	$492.00	$236.26	$1,152.19	$709.82	$5,128.28
Number of accounts forwarded to the Treasury for settlement:								
1910							54	54
1911							741	741
1912							1,225	1,225
Number of checks lost	37	23	35	30	39	22	1	187
Number of letters written and received in the ordinary transaction of business	8,983	10,000	6,000	3,200	10,685	5,368	28,422	72,658
Amount received from timber sales, etc	$380,999.52	$381,560.28	$439,126.34	$360,628.54	$272,433.03	$327,299.45		$2,162,047.16
Amount received for cooperative work					$1,926.10		$1,294.50	$3,220.60
Number of requisitions drawn on the Treasury for advances	10	11	13	11	20	26	14	105
Number temporary special disbursing agents and district fiscal agents active	1	2	1	1	3	5	2	15
Number of requisitions issued	10	11	13	11	20	26	14	105
Amount	$948,000.00	$830,000.00	$649,250.00	$934,700.00	$940,068.73	$948,777.63	$301,000.00	$5,551,796.36

ANNUAL REPORT OF EXPENDITURES.

A classified statement of the expenditures of the department for the fiscal year ended June 30, 1912 (extended to August 31, 1912), was prepared in accordance with law and will be submitted to the Committee on Expenditures. A recapitulation of the expenditures of the department will be found below, classified as required by the committee:

Recapitulation of the several appropriations for the entire Department of Agriculture as distributed among the following groups, and the total expenditures under each.

Statutory salaries	$4,351,379.98
Lump-fund salaries in Washington	1,341,688.16
Lump-fund salaries outside of Washington	6,699,891.03
Stationery	104,181.90
Miscellaneous supplies and services, equipment, books, machinery, etc.	2,271,043.91
Furniture	58,049.65
Fuel	36,047.58
Freight	90,547.50
Express	17,859.00
Telegraph	158,090.50
Telephone	50,666,92
Rent	297,464.83
Gas and electricity	28,264.42
Apparatus, instruments, and laboratory material	157,152.42
Travel and station and field expenses	1,172,930.58
Total	16,835,258.38

Total appropriations for Department of Agriculture		21,237,920.76
Total expenditures under above groups	$16,835,258.38	
Forest Service refunds:		
To depositors, excess deposits	47,716.54	
Payments to States and Territories, 25 per cent of receipts	482,376.18	
Burial expenses, fire fighters, Forest Service	10,972.65	
Reimbursement for horses lost, fire fighting, Forest Service	2,667.90	
Reimbursement for time lost, fire fighting, Forest Service	5,053.67	
Total expenditures of entire Department of Agriculture		17,384,045.32
Unexpended balance on Aug. 31, 1912		3,853,875.44
Repayments to credit of appropriations		7,825.71
Net unexpended balance on Aug. 31, 1912		3,861,701.15
Of this amount there was available for further disbursement		2,054,793.44
Balance		1,806,907.71
Outstanding liabilities (estimated)		453,745.98
Balance to be turned back in Treasury (estimated)		1,353,161.73

CONDITION OF WORK IN THE DIVISION.

The work of the division is as nearly up to date as it is practicable to bring up work of this character. There is a growing need, however, for additional funds for the temporary employment of stenographers and typewriters to assist in the preparation of the several fiscal reports annually required by Congress.

FINANCES OF THE DEPARTMENT FOR 73 YEARS.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture from the fiscal year 1839 to the fiscal year 1912, inclusive.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Collection of agricultural statics, etc	Mar. 3, 1839	5	354	9	1839	$1,000.00	$1,000.00	....
	Aug. 26, 1842	5	533	26	1842	1,000.00	1,000.00	....
	Mar. 3, 1843	5	642	1	1844	2,000.00	2,000.00	....
	June 17, 1844	5	687	1	1845	2,000.00	2,000.00	....
	Mar. 3, 1845	5	757	1	1846	3,000.00	3,000.00	....
	Mar. 3, 1847	9	160	1	1847	3,000.00	3,000.00	....
	Aug. 12, 1848	9	285	1	1848	3,500.00	3,500.00	....
Chemical analyses of vegetable substances	do	9	285	1	1848	1,000.00	1,000.00	....
Collection of agricultural statistics, etc	Mar. 3, 1849	9	364	1	1849	3,500.00	3,500.00	....
Chemical analyses of vegetable substances	do	9	364	1	1850	1,000.00	1,000.00	....
Collection of agricultural statistics	Sept. 30, 1850	9	541	1	1850	4,500.00	4,500.00	....
	Mar. 3, 1851	9	615	1	1851	5,500.00	5,500.00	....
Collection of agricultural statistics and purchase of seeds	Aug. 31, 1852	10	95	1	1852	5,000.00	5,000.00	....
	Mar. 3, 1853	10	208	1	1853	5,000.00	5,000.00	....
Collection of agricultural statistics and purchase, etc., of seeds	May 31, 1854	10	292	1	1854	10,000.00	10,000.00	....
	Aug. 4, 1854	10	567	1	1855	50,000.00	50,000.00	....
	Mar. 3, 1855	10	664	1				
Collection of agricultural statistics, etc., and purchase, etc., of seeds	May 15, 1856	11	14	1	1856	30,000.00	30,000.00	....
	Aug. 18, 1856	11	89	1	1857	75,000.00	75,000.00	....
	Mar. 3, 1857	11	226	1	1858	60,000.00	60,000.00	....
Information in relation to consumption of cotton	do	11	226	1	1858	3,500.00	3,157.25	$342.75
Collection of agricultural statistics, etc., and purchase, etc., of seeds	June 12, 1858	11	321	1	1859	60,000.00	60,000.00	....
	Mar. 33, 1859	11	427	1	1860	40,000.00	40,000.06	....
	June 25, 1860	12	108	1	1861	60,000.00	60,000.00	....
	Mar. 2, 1861	12	217	1	1862	64,000.00	63,704.21	295.79
	Feb. 13, 1862	12	338	...				
Collection of agricultural statistics, etc., and purchase, etc., of seeds, including a deficiency appropriation of $20,000, made Mar. 3, 1863	Mar. 1, 1862	12	350	1	1863	80,000.00	80,000.00	....
Salaries	Feb. 25, 1863	12	691	1	1864	5,000.00	5,000.00	....
Collection of agricultural statistics, etc., and purchase, etc., of seeds	do	12	691	1	1864	87,000.00	87,000.00	....
Culture of cotton and tobacco	do	12	691	1	1864	3,000.00	3,000.00	....
Investigations with flax and hemp	do	12	691	1	1864	20,000.00	9,500.00	10,500.00
Purchase of sorghum seed	Mar. 14, 1864	13	23	1	1864	2,000.00	2,000.00	....
To rebuild shop in propagating garden	do	13	23	1	1864	800.00	800.00	....
Postage	do	13	23	1	1864	1,320.00	1,320.00	....
Furniture, carpets, fuel, etc	do	13	23	1	1864	650.00	650.00	....
Salaries	June 25, 1864	13	155	1	1865	38,300.00	38,300.00	....
	July 2, 1864	13	350	2				
Contingent expenses	June 25, 1864	13	155	1	1865	3,500.00	3,500.00	....
Collecting agricultural statistics	do	13	155	1	1865	20,000.00	20,000.00	....
Furniture, carpets, etc	do	13	155	1	1865	800.00	800.00	....
Library and laboratory	do	13	155	1	1865	4,000.00	4,000.00	....
Purchase and distribution of seeds	do	13	155	1	1865	61,000.00	61,000.00	....
Experimental garden and grounds	do	13	155	1	1865	15,800.00	15,800.00	....
To pay a debt incurred in preparing the Agricultural Report for 1861	July 2, 1864	13	350	2	1865	3,704.05	3,596.55	107.50
Rent, etc., of commissioner's office	July 4, 1864	13	381	3	1865	3,500.00	3,500.00	....
Salaries	Mar. 2, 1865	13	160	3	1866	46,726.59	46,726.59	....
		13	455	1				
Contingent expenses	do	13	455	1	1866	7,500.00	7,500.00	....
Collecting agricultural statistics	do	13	455	1	1866	20,000.00	20,000.00	....
Purchase, etc., of seeds	do	13	160	3	1866	70,165.90	70,165.90	....
		13	455	1				
Experimental garden and grounds, etc	do	13	160	3	1866	23,395.33	23,395.33	....
		13	455	1				
Salaries	July 23, 1866	14	201	1	1867	39,600.00	39,600.00	....
Contingent expenses	do	14	201	1	1867	11,500.00	11,500.00	....
Collecting agricultural statistics	do	14	201	1	1867	10,000.00	10,000.00	....

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Purchase of seeds	July 23, 1866 Mar. 30, 1867	14 14 15	201 202 28	1 1 1	1867	$115,200.00	$115,200.00	....
Experimental garden and grounds, etc	July 23, 1866	14	202	1	1867	22,800.00	22,800.00	....
Salaries	Mar. 2, 1867	14	451	1	1868	38,020.00	38,020.00	....
Contingent expenses	do	14	451	1	1868	13,000.00	13,000.00	....
Collecting agricultural statistics	do	14	451	1	1868	10,000.00	8,406.34	$1,593.66
Purchase, etc., of seeds	do	14	452	1	1868	85,200.00	85,200.00	....
Museum	do	14	452	1	1868	10,000.00	10,000.00	....
Experimental garden and grounds	do	14	452	1	1868	22,800.00	22,800.00	....
To erect a building for the Department of Agriculture	do	14	464	1	1868	100,000.00	99,668.00	332.00
For certain goods and services furnished the department	July 13, 1868	15	90	1	......	37,604.70	37,604.70	....
Salaries	July 20, 1868	15	105	1	1869	65,368.00	65,368.00	....
Collecting agricultural statistics	do	15	106	1	1869	10,000.00	10,000.00	....
Contingent expenses	do	15	196	1	1869	31,090.00	31,090.00	....
Experimental garden and grounds	do	15	106	1	1869	23,500.00	23,500.00	....
Purchase, etc., of seeds	do	15	106	1	1869	20,000.00	20,000.00	....
Furniture, cases, and repairs	do	15	106	1	1869	22,635.00	22,635.00	....
Salaries	Mar. 3, 1869	15 15	297 298	1 1	1870	67,240.00	67,720.00	1,520.00
Collecting agricultural statistics	do	15	298	1	1870	15,000.00	15,000.00	....
Investigations of cattle disease	do	15	298	1	1870	15,000.00	12,695.60	2,304.40
Contingent expenses	do	15	298	1	1870	13,200.00	13,200.00	....
Furniture, cases, and repairs	do	15	298	1	1870	2,500.00	2,500.00	....
Experimental garden and grounds	do	15	298	1	1870	21,500.00	21,500.00	....
Purchase, etc., of seeds	do	15	298	1	1870	20,000.00	18,981.33	1,018.67
Salaries	July 12, 1870 July 15, 1870	16 16	245 314	1 1	1871	71,980.00	71,811.64	168.36
Collecting agricultural statistics	July 12, 1870	16	245	1	1871	15,000.00	15,000.00	....
Purchase, etc., of seeds	do	16	246	1	1871	30,000.00	28,865.17	1,134.83
Experimental garden and grounds	do July 15, 1870	16 16 16	246 302 303	1 1 1	1871	53,200.00	53,200.00	....
Contingent expenses	July 12, 1870	16	246	1	1871	8,100.00	8,100.00	....
Furniture, cases, and repairs	do	16	246	1	1871	4,700.00	4,700.00	....
Collecting and modeling specimens of fruit	do	16	246	1	1871	1,000.00	1,000.00	....
Library	do	16	246	1	1871	1,000.00	1,000.00	....
Herbarium	do	16	246	1	1871	1,000.00	1,000.00	....
Laboratory	do	16	246	1	1871	1,700.00	1,700.00	....
Folding room	do	16	246	1	1871	500.00	500.00	....
Salaries	Mar. 3, 1871	16	489	1	1872	75,170.00	75,017.89	152.11
Collecting agricultural statistics	do	16	489	1	1872	15,000.00	14,059.36	940.64
Purchase and distribution of seeds, etc	do	16	489	1	1872	45,000.00	45,000.00	....
Experimental garden and grounds	do	16 16	489 509	1 1	1872	36,800.00	36,800.00	....
Contingent expenses	do	16 16	489 490	1 1	1872	12,900.00	12,900.00	....
Furniture, cases, and repairs	do	16	490	1	1872	4,700.00	4,700.00	....
Collecting and modeling specimens of fruit	do	16	490	1	1872	1,000.00	1,000.00	....
Herbarium	do	16	490	1	1872	1,000.00	1,000.00	....
Library	do	16	490	1	1872	2,050.00	2,050.00	....
Laboratory	do	16	490	1	1872	3,450.00	3,450.00	....
Salaries	May 8, 1872	17	77	1	1873	75,890.00	75,889.73	.27
Collecting agricultural statistics	do	17	77	1	1873	15,000.00	15,000.00	....
Purchase and distribution of seeds	do	17	77	1	1873	55,000.00	55,000.00	....
Experimental garden and grounds	do June 10, 1872	17 17	77 368	1 1	1873	31,000.00	31,000.00	....
Contingent expenses	May 8, 1872	17 17	77 78	1 1	1873	13,300.00	12,507.06	792.94
Folding room	do	17	77	1	1873	300.00	300.00	....
Furniture, cases, and repairs	do	17	78	1	1873	5,200.00	5,200.00	....
Museum and herbarium	do June 10, 1872	17 17	78 369	1 1	1873	5,000.00	4,674.43	325.57

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Library	May 8, 1872	17	78	...	1873	$1,750.00	$1,750.00	....
Salaries	Mar. 3, 1873	17	506	1	1874	78,190.00	76,924.00	$1,266.00
Collecting agricultural statistics	....do.......	17	506	1	1874	15,000.00	11,553.20	3,446.80
Purchase and distribution of seeds, etc	....do.......	17 17 17	506 507 540	1 1 1	1874	65,000.00	64,904.89	95.11
Experimental garden and grounds	....do.......	17 17	507 529	1 1	1874	26,200.00	25,731.74	468.26
Museum and herbarium	....do.......	17	507	1	1874	2,000.00	1,942.02	57.98
Contingent expenses	....do.......	17	507	1	1874	13,600.00	12,699.34	900.66
Furniture, cases, and repairs	....do.......	17	507	1	1874	4,200.00	3,302.40	897.60
Library	....do.......	17	507	1	1874	1,500.00	1,259.10	240.90
Postage	....do.......	17	542	4	1874	52,000.00	35,449.09	16,550.91
Salaries	June 20, 1874	18	107	1	1875	77,180.00	77,127.60	52.40
Collecting agricultural statistics	....do.......	18	107	1	1875	15,000.00	12,147.56	2,852.44
Purchase and distribution of seeds, etc	....do....... Jan. 25, 1875	18 18	107 303	1 3	1875	95,000.00	94,719.83	280.17
Furniture, cases, and repairs	June 20, 1874	18	107	1	1875	4,200.00	4,135.36	64.64
Experimental garden and grounds	....do....... June 23, 1874	18 18	107 227	1 1	1875	24,100.00	24,094.06	5.94
Contingent expenses	June 20, 1874	18	107	1	1875	12,600.00	10,972.61	1,627.39
Museum and herbarium	....do....... June 23, 1874	18 18	107 227	1 1	1875	4,500.00	3,300.00	1,020.00
Laboratory	....do.......	18	227	1	1875	1,300.00	1,300.00	....
Library	....do.......	18	227	1	1875	1,500.00	1,087.90	412.10
Postage	June 20, 1874	18	107	1	1875	52,000.00	42,633.00	9,367.00
To publish commissioner's report for the years 1872 and 1873	June 23, 1874	18	227	1	1875	50,000.00	49,561.91	438.09
Salaries	Mar. 3, 1875	18	368	1	1876	77,180.00	77,115.71	64.29
Collecting agricultural statistics	....do.......	18	368	1	1876	15,000.00	14,500.00	500.00
Purchase and distribution of seeds	....do.......	18	368	1	1876	65,000.00	65,000.00	....
Experimental garden and grounds	....do.......	18 18	368 394	1 1	1876	19,990.00	19,956.11	33.89
Museum and herbarium	....do.......	18	368	1	1876	2,000.00	1,993.55	6.45
Furniture, cases, and repairs	....do.......	18	368	1	1876	3,300.00	3,124.23	175.77
Library	....do.......	18	368	1	1876	1,250.00	1,046.84	203.16
Laboratory	....do.......	18	368	1	1876	1,300.00	1,300.00	....
Contingent expenses	....do.......	18	368	1	1876	12,100.00	11,378.91	721.09
Postage	....do.......	18	368	1	1876	52,000.00	3,428.29	48,571.71
Salaries	July 21, 1876 Aug. 15, 1876	19 19	95 167	1 1	1877	67,836.96	67,806.19	30.77
Experimental garden and grounds	July 31, 1876 Aug. 15, 1876	19 19	115 167	1 1	1877	11,550.00	11,550.00	....
Collecting agricultural statistics	....do.......	19	167	1	1877	10,000.00	10,000.00	....
Purchase and distribution of seeds, etc	....do....... Mar. 3, 1877	19 19	167 319	1 1	1877	85,000.00	80,000.00	5,000.00
Museum and herbarium	Aug. 15, 1876	19	167	1	1877	2,000.00	2,000.00	....
Furniture, cases, and repairs	....do.......	19	167	1	1877	2,000.00	2,000.00	....
Library	....do.......	19	167	1	1877	1,000.00	800.00	200.00
Laboratory	....do.......	19	167	1	1877	1,300.00	1,300.00	....
Contingent expenses	....do.......	19	167	1	1877	10,000.00	8,800.00	1,200.00
Postage	....do.......	19	167	1	1877	4,000.00	3,950.00	50.00
Salaries	Mar. 3, 1877	19	317	1	1878	65,640.00	65,640.00	....
Collecting agricultural statistics	....do.......	19	317	1	1878	15,000.00	15,000.00	....
Purchase and distribution of seeds, etc	....do.......	19	317	1	1878	75,000.00	74,579.33	420.67
Experimental garden and grounds	....do.......	19 19	317 360	1 1	1878	10,500.00	10,500.00	....
Museum	....do.......	19	317	1	1878	1,500.00	1,500.00	....
Furniture, cases, and repairs	....do.......	19	317	1	1878	4,500.00	4,500.00	....
Library	....do.......	19	317	1	1878	1,000.00	1,000.00	....
Laboratory	....do.......	19	317	1	1878	1,000.00	1,000.00	....
Contingent expenses	....do.......	19	317	1	1878	8,000.00	8,000.00	....
Postage	....do.......	19	317	1	1878	4,000.00	3,415.61	584.39
Report on forestry	....do.......	19	360	1	1878	2,500.00	2,500.00	....
International Industrial Exposition at Paris	Dec. 15, 1877	20	246	4	1878	10,000.00	10,000.00	....
Salaries	June 19, 1878	20	203	1	1879	66,900.00	66,900.00	....
Collecting agricultural statistics	....do.......	20	203	1	1879	10,000.00	10,000.00	....
Purchase and distribution of seeds, etc	....do.......	20	203	1	1879	75,000.00	75,000.00	....
Experimental garden and grounds	....do.......	20 20	203 240	1 1	1879	13,500.00	13,500.00	....

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Museum	June 19, 1878	20	203	1	1879	$1,000.00	$1,000.00	....
Furniture, cases, and repairs	do	20	204	1	1879	4,000.00	4,000.00	....
Library	do	20	204	1	1879	1,000.00	1,000.00	....
Laboratory	do	20	204	1	1879	1,500.00	1,500.00	....
Contingent expenses	do	20	204	1	1879	8,000.00	8,000.00	....
Postage	do	20	204	1	1879	4,000.00	3,960.00	$40.00
Investigating the history and habits of insects	do	20	204	1	1879	10,000.00	10,000.00	....
Investigating diseases of domestic animals	do	20	240	1	1879	10,000.00	10,000.00	....
To erect a stable	Mar. 3, 1879	20	392	1	1879	1,500.00	1,500.00	....
Salaries	June 21, 1879	21	23	1	1880	66,900.00	66,900.00	....
Collecting agricultural statistics	do	21	23	1	1880	10,000.00	9,982.88	17.12
Purchase and distribution of seeds, etc	do	21	23	1	1880	75,000.00	75,000.00	....
Experimental garden and grounds	do	21	23	1	1880	13,100.00	13,100.00	....
Museum	do	21	23	1	1880	1,000.00	1,000.00	....
Furniture, cases, and repairs	do	21	23	1	1880	4,000.00	4,000.00	....
Library	do	21	23	1	1880	1,000.00	1,000.00	....
Laboratory	do	21	23	1	1880	1,500.00	1,500.00	....
Contingent expenses	do	21	23	1	1880	8,000.00	8,000.00	....
Postage	do	21	23	1	1880	4,000.00	4,000.00	....
Investigating the history and habits of insects	do	21	29	1	1880	5,000.00	5,000.00	....
Investigating diseases of domestic animals	do	21	30	1	1880	10,000.00	8,878.84	1,121.16
Salaries	June 16, 1880	21	292	1	1881	69,200.00	69,185.22	14.78
Purchase and distribution of seeds, etc	do May 3, 1881	21 21	294 453	1 1	1881	102,160.31	102,157.48	2.83
Collecting agricultural statistics	June 16, 1880	21	293	1	1881	10,000.00	9,985.60	14.40
Experimental garden and grounds	do	21	294	1	1881	12,600.00	12,600.00	....
Museum	do	21	294	1	1881	1,000.00	1,000.00	....
Furniture, cases, and repairs	do	21	294	1	1881	5,000.00	5,000.00	....
Library	do	21	294	1	1881	1,000.00	1,000.00	....
Laboratory	do	21	295	1	1881	4,000.00	4,000.00	....
Contingent expenses	do	21	295	1	1881	10,000.00	9,769.17	230.83
Postage	do	21	295	1	1881	4,000.00	3,838.00	162.00
Report on forestry	do	21	296	1	1881	5,000.00	3,762.51	1,237.49
Investigating the history and habits of insects	do	21	294	1	1881	5,000.00	4,997.31	2.69
Investigating the diseases of domestic animals	do	21	295	1	1881	10,000.00	10,000.00	....
Examination of fibers	do	21	295	1	1881	4,000.00	4,000.00	....
Experiments in the manufacture of sugar	do	21	295	1	1881	7,500.00	7,500.00	....
Collecting data touching arid regions of the United States	do	21	295	1	1881	5,000.00	460.00	4,540.00
Reclamation of arid lands	do	21	295	1	1881	20,000.00	18,353.55	(1)
Salaries	Mar. 3, 1881	21	381	1	1882	79,500.00	79,491.81	8.19
Collecting agricultural statistics	do	21	382	1	1882	10,000.00	10,000.00	....
Laboratory	do	21	382	1	1882	6,000.00	5,811.85	188.15
Purchase and distribution of seeds, etc	do Apr. 16, 1882	21 22	382 44	1 1	1882	100,000.00	99,991.53	8.47
Experiments in the culture, etc., of tea	Mar. 3, 1881	21	383	1	1882	10,000.00	8,750.87	1,249.13
Experimental garden and grounds	do	21 21	383 385	1 1	1882	15,000.00	14,968.25	31.75
Museum	do	21	383	1	1882	1,000.00	1,000.00	....
Furniture, cases, and repairs	do	21	383	1	1882	4,000.00	4,000.00	....
Library	do	21	383	1	1882	1,000.00	973.85	26.15
Investigating the history and habits of insects	do	21	383	1	1882	20,000.00	19,998.94	1.06
Examination of fibers	do	21	384	1	1882	5,000.00	5,000.00	....
Investigating the diseases of domestic animals	do	21	384	1	1882	25,000.00	22,443.89	2,556.11
Collecting data touching the arid regions of the United States	do	21	384	1	1882	5,000.00	4,216.55	783.45
Reclamation of arid lands, including an unexpended balance of $1,646.45 from fiscal year 1881	do	21	384	1	1882	11,646.45	11,561.19	(2)

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[1] Unexpended balance of $1,646.45 carried to fiscal year 1882.

[2] Unexpended balance of $85.26 carried to fiscal year 1883.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Report on forestry	Mar. 3, 1881	21	384	1	1882	$5,000.00	$4,941.00	$59.00
Postage	do	21	384	1	1882	4,000.00	4,000.00	....
Contingent expenses	do	21	384	1	1882	10,000.00	10,000.00	....
Building for display of agricultural implements	do	21	385	1	1882	10,000.00	10,000.00	....
Experiments in the manufacture of sugar (including $864.60 from sale of molasses, etc.)	do	21	384	1	1882	35,864.60	32,333.75	(1)
Transportation of specimens from Atlanta	Feb. 13, 1882	22	3	1	1882	5,000.00	4,998.91	1.09
Salaries	May 19, 1882	22	89	1	1883	102,580.00	102,575.49	4.51
Collecting agricultural statistics	do	22	90	1	1883	80,000.00	78,170.80	1,829.20
Laboratory	do	22	90	1	1883	6,000.00	6,000.00	....
Purchase and distribution of seeds, etc	do	22	90	1	1883	80,000.00	80,000.00	....
Experiments in the culture, etc., of tea	do	22	91	1	1883	5,000.00	3,905.66	1,094.34
Experimental garden and grounds	do	22 22	91 92	1 1	1883	15,500.00	15,471.82	28.18
Museum	do	22	91	1	1883	1,000.00	1,000.00	....
Furniture, cases, and repairs	do	22	91	1	1883	6,700.00	6,700.00	....
Library	do	22	91	1	1883	1,500.00	1,485.32	14.68
Investigating the history and habits of insects	do	22	91	1	1883	20,000.00	19,997.75	2.25
Examination of fibers	do	22	91	1	1883	10,000.00	7,961.94	2,038.06
Investigating the diseases of domestic animals	do	22	92	1	1883	25,000.00	21,584.28	3,415.72
Reclamation of arid lands, including an unexpended balance of $85.26 from fiscal year 1882	do	22	92	1	1883	20,085.26	12,429.13	(2)
Report on forestry	do	22	92	1	1883	10,000.00	8,731.99	1,268.01
Postage	do	22	92	1	1883	4,000.00	3,977.49	22.51
Contingent expenses	do	22	92	1	1883	15,000.00	14,920.74	79.26
Experiments in the manufacture of sugar, including an unexpended balance of $3,530.85 from fiscal year 1882	do	22	92	1	1883	28,530.85	28,529.31	1.54
Erection of building for seed division	Aug. 7, 1882	22	306	1	1883	25,000.00	25,000.00	....
Report on the Angora goat	do	22	337	1	1883	500.00	500.00	....
Salaries	Jan. 20, 1883	22	408	1	1884	127,640.00	127,639.87	.13
Collecting agricultural statistics	do	22	410	1	1884	80,000.00	79,770.86	229.14
Laboratory, and for experiments in the manufacture of sugar, including $842.18 from the sale of sirup, etc	do	22	410	1	1884	16,842.18	16,829.26	12.92
Purchase and distribution of seeds, etc	do	22	410	1	1884	75,000.00	74,986.48	13.52
Experimental gardens and grounds	do	22 22	409 411	1 1	1884	15,500.00	15,448.87	51.13
Museum	do	22	409	1	1884	1,000.00	993.51	6.49
Furniture, cases, and repairs	do	22	410	1	1884	6,000.00	5,998.82	1.18
Library	do	22	411	1	1884	1,500.00	1,439.86	60.14
Investigating the history and habits of insects	do Aug. 4, 1886	22 24	409 273	1 1	1884	20,002.82	20,002.82	....
Reclamation of arid lands, including an unexpended balance of $7,656.13 from fiscal year 1883	Jan. 20, 1883	22	411	1	1884	17,656.13	16,164.68	1,491.45
Investigating the diseases of domestic animals	do	22	411	1	1884	25,000.00	24,011.85	988.15
Report on forestry	do	22	411	1	1884	10,000.00	9,998.30	1.70
Postage	do	22	411	1	1884	4,000.00	3,841.48	158.52
Contingent expenses	do	22	411	1	1884	14,000.00	13,991.43	8.57
Building of greenhouse	do	22	631	1	1884	2,500.00	2,500.00	....
Salaries	June 5, 1884	23	36	1	1885	137,590.00	137,557.80	32.20
Collecting agricultural statistics	do	23	38	1	1885	100,000.00	99,986.59	13.41
Bureau of Animal Industry	May 29, 1884	23	31	1	1885	150,000.00	56,807.73	(3)
Purchase and distribution of seeds, etc	June 5, 1884	23	38	1	1885	100,000.00	99,983.82	16.18

[1] Unexpended balance of $3,530.85 carried to fiscal year 1883.
[2] Unexpended balance of $7,656.13 carried to fiscal year 1884.
[3] Unexpended balance of $93,192.27 carried to fiscal year 1886.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Laboratory, and for experiments in the manufacture of sugar	June 5, 1884	23	38	1	1885	$50,000.00	$49,996.70	$3.30
Investigating the history and habits of insects	....do......	23	37	1	1885	20,000.00	19,986.83	13.17
Silk culture	....do......	23	39	1	1885	15,000.00	14,916.23	83.77
Contingent expenses	....do......	23	39	1	1885	15,000.00	14,862.20	137.80
Report on forestry	....do......	23	39	1	1885	10,000.00	9,987.36	12.64
Experimental garden and grounds	....do...... Oct. 19, 1888	23 25	37 581	1 1	1885	17,840.25	17,513.67	326.58
Furniture, cases, and repairs	June 5, 1884	23	38	1	1885	6,000.00	5,947.27	52.73
Postage	....do......	23	39	1	1885	4,000.00	3,956.98	43.02
Experiments in the culture, etc., of tea	....do......	23	39	1	1885	3,000.00	2,998.90	1.10
Library	....do......	23	39	1	1885	1,500.00	1,403.63	96.37
Museum	....do......	23	37	1	1885	1,000.00	1,000.00	....
Quarantine stations	June 7, 1884	23	207	1	1885	25,000.00	22,029.18	(1)
Salaries	Mar. 3, 1885	23	353	1	1886	137,590.00	137,337.42	252.58
Collecting agricultural statistics	....do......	23	355	1	1886	75,000.00	68,723.06	6,276.94
Bureau of Animal Industry, including an unexpended balance of $93,192.27 from fiscal year 1885	....do......	23	355	1	1886	193,192.27	58,261.05	134,931.22
Quarantine stations, including an unexpended balance of $2,970.82 for fiscal year 1885	....do......	23	356	1	1886	32,970.82	18,958.57	14,012.25
Purchase and distribution of seeds, etc	....do......	23	354	1	1886	100,000.00	99,980.24	19.76
Laboratory, and for experiments in the manufacture of sugar	....do......	23	354	1	1886	40,000.00	39,942.11	57.89
Investigating the history and habits of insects	....do......	23	354	1	1886	25,000.00	24,976.46	23.54
Silk culture	....do...... Oct. 19, 1888	23 25	356 581	1 1	1886	15,012.00	15,008.50	3.50
Contingent expenses	Mar. 3, 1885	23	356	1	1886	15,000.00	14,937.62	62.38
Report on forestry	....do......	23	356	1	1886	10,000.00	9,836.83	163.17
Experimental garden and grounds	....do...... Aug. 4, 1886 Oct. 19, 1888	23 24 25	254 273 581	1 1 1	1886	17,208.13	17,024.88	183.25
Furniture, cases, and repairs	Mar. 3, 1885	23	354	1	1886	7,500.00	7,423.59	76.41
Postage	....do......	23	356	1	1886	4,000.00	2,556.20	1,443.80
Experiments in the culture, etc., of tea	....do......	23	356	1	1886	3,000.00	1,813.67	1,186.33
Library	....do......	23	355	1	1886	1,500.00	1,417.03	82.97
Museum	....do......	23	354	1	1886	1,000.00	998.88	1.12
Salaries	June 30, 1886	24	100	1	1887	142,890.00	141,420.68	1,469.32
Collecting agricultural statistics	....do......	24	103	1	1887	65,000.00	64,955.14	44.86
Bureau of Animal Industry	....do......	24	103	1	1887	100,000.00	99,985.56	14.44
Quarantine stations	....do......	24	103	1	1887	30,000.00	10,639.44	19,360.56
Purchase and distribution of seeds, etc	....do......	24	102	1	1887	100,000.00	99,998.37	1.63
Laboratory	....do......	24	101	1	1887	6,000.00	4,570.86	1,429.14
Experiments in the manufacture of sugar, including $1,891 from sales	....do......	24	101	1	1887	95,891.00	95,853.14	37.86
Investigating the history and habits of insects	....do...... Oct. 19, 1888	24 25	101 582	1 1	1887	15,096.26	15,088.05	8.20
Silk culture, including $864.81 from sale of raw silk	June 30, 1886 Oct. 19, 1888	24 25	101 581	1 1	1887	15,939.56	15,939.56	....
Contingent expenses	June 30, 1886	24	104	1	1887	15,000.00	14,936.83	63.17
Report on forestry	....do......	24	103	1	1887	8,000.00	7,953.50	46.50
Experimental gardens and grounds	....do......	24	102	1	1887	23,200.00	22,202.15	997.85
Furniture, cases, and repairs	....do......	24	103	1	1887	8,125.00	8,092.11	32.89
Postage	....do......	24	104	1	1887	4,000.00	3,500.00	500.00
Experiments in the culture, etc., of tea	....do......	24	104	1	1887	2,000.00	1,753.78	246.22
Pomological information	....do......	24	100	1	1887	3,000.00	2,993.20	6.80
Library	....do......	24	103	1	1887	1,500.00	1,428.65	71.35
Botanical investigations	....do......	24	100	1	1887	5,000.00	4,988.12	11.88

[1] Unexpended balance of $2,970.82 carried to fiscal year 1886.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Museum	June 30, 1886	24	102	1	1887	$1,000.00	$998.88	$1.12
Ornithology and mammalogy	do	24	101	1	1887	10,000.00	9,999.98	.02
Reclamation of arid lands	do	24	103	1	1887	5,000.00	....	5,000.00
Adulteration of food	do	24	100	1	1887	1,000.00	989.14	10.86
Salaries	Mar. 3, 1887	24	495	1	1888	161,490.00	158,220.87	3,269.13
Collecting agricultural statistics	do	24	498	1	1888	65,000.00	64,965.33	34.67
Bureau of Animal Industry, including $100,000 immediately available	do	24	499	1	1888	500,000.00	499,975.32	24.68
Quarantine stations	do	24	499	1	1888	20,000.00	9,538.75	10,461.25
Purchase and distribution of seeds, etc	do	24	498	1	1888	103,000.00	102,587.55	412.45
Laboratory	do	24	497	1	1888	6,000.00	5,969.89	30.11
Experiments in the manufacture of sugar	do	24	497	1	1888	50,000.00	49,997.43	2.57
Experiments in the manufacture of sugar (deficiency)	Oct. 19, 1888	25	582	1	1887 1888	8,000.00	7,927.50	72.50
Investigating the history and habits of insects	Mar. 3, 1887	24	497	1	1888	20,000.00	20,000.00	....
Silk culture, including $1,989.06 from sale of raw silk	do	24	497	1	1888	16,989.06	16,989.02	.04
Contingent expenses	do	24	499	1	1888	15,000.00	14,825.57	174.43
Report on forestry	do	24	499	1	1888	8,000.00	7,996.10	3.90
Experimental gardens and grounds	do	24	497	1	1888	24,800.00	24,706.86	93.14
Furniture, cases, and repairs	do	24	498	1	1888	7,000.00	6,982.88	17.12
Postage	do	24	499	1	1888	4,000.00	3,000.00	1,000.00
Pomological information	do	24	497	1	1888	3,000.00	2,971.69	28.31
Library	do	24	499	1	1888	2,000.00	1,983.78	16.22
Botanical investigations	do	24	496	1	1888	7,000.00	6,997.28	2.72
Museum	do	24	497	1	1888	1,000.00	947.41	52.59
Ornithology and mammalogy	do	24	497	1	1888	3,940.00	3,869.23	70.77
Adulteration of food	do	24	497	1	1888	1,000.00	830.16	169.84
Salaries	July 18, 1888 Mar. 2, 1889	25 25	328 923	1 1	1889	171,890.32	169,152.51	2,737.81
Collecting agricultural statistics	July 18, 1888	25	332	1	1889	70,000.00	69,162.45	837.55
Botanical investigations	do	25	330	1	1889	35,000.00	22,076.75	(1)
Investigating the history and habits of insects	do Sept. 30, 1890	25 26	331 525	1 1	1889	20,131.64	20,131.64	....
Ornithology and mammalogy	July 18, 1888 Mar. 2, 1889 Sept. 30, 1890 Mar. 3, 1891	25 25 26 26	332 838 525 880	1 1 1 1	1889	5,025.90	5,022.06	3.84
Pomological information	July 18, 1888	25 26	330 526	1 1	1889	4,024.48	4,020.32	4.16
Microscopical investigations	do	25	330	1	1889	1,000.00	999.87	.13
Laboratory	do Mar. 2, 1889	25 25	330 837	1 1	1889	11,000.00	9,994.25	1,005.75
Forestry investigations	July 18, 1888	25	333	1	1889	8,000.00	7,999.03	.97
Purchase and distribution of seeds	do	25	332	1	1889	104,200.00	104,168.73	31.27
Experimental gardens and grounds	do	25	332	1	1889	26,640.00	26,639.83	.17
Museum	do	25	332	1	1889	1,000.00	891.25	108.75
Furniture, cases, and repairs	do	25	333	1	1889	7,350.00	7,236.74	113.26
Library	do	25	333	1	1889	2,000.00	1,956.34	43.66
Postage	do	25	333	1	1889	4,000.00	4,000.00	....
Contingent expenses	do Mar. 3, 1891	25 26	333 881	1 1	1889	15,010.00	15,009.22	.78
Office of Experiment Stations	July 18, 1888	25	334	1	1889	10,000.00	9,033.77	966.23
Experiments in the manufacture of sugar	do	25	333	1	1889	100,000.00	41,635.24	(2)
Quarantine stations	do	25	333	1	1889	15,000.00	11,628.39	3,371.61
Bureau of Animal Industry	do	25	333	1	1889	500,000.00	479,623.57	20,376.43
Silk culture, including $708.26 from sale of raw silk	do	25	331	1	1889	23,208.26	23,208.26	....
Salaries	Mar. 2, 1889	25	835	1	1890	178,580.00	175,547.04	3,032.96
Collecting agricultural statistics	do	25	839	1	1890	75,000.00	74,327.51	672.49
Botanical investigations, including an unexpended balance of $12,923.25 from fiscal year 1889	do July 28, 1892	25 27	836 296	1 1	1890	48,009.25	47,990.38	18.87

[1] Unexpended balance of $12,923.25 carried to fiscal year 1890.

[2] Unexpended balance of $58,364.76 carried to fiscal year 1890.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Investigating the history and habits of insects	Mar. 2, 1889	25	37	1	1890	$20,000.00	$19,92.72	$107.28
Ornithology and mammalogy	....do....... July 14, 1890	25 26	838 285	1 1	1890	7,000.00	6,994.16	5.84
Pomological information	Mar. 2, 1889 Mar. 3, 1891	25 26	837 881	1 1	1890	4,304.79	4,304.79	....
Microscopical investigations	Mar. 2, 1889 July 28, 1892	25 27	837 296	1 1	1890	1,062.50	1,062.50	....
Laboratory	Mar. 2, 1889	25	837	1	1890	6,000.00	5,461.99	538.01
Forestry investigations	....do.......	25	840	1	1890	8,000.00	7,999.96	.04
Purchase and distribution of seeds	....do.......	25	839	1	1890	104,200.00	104,174.55	25.45
Experimental gardens and grounds	....do.......	25	838	1	1890	26,640.00	26,478.45	161.55
Museum	....do.......	25	838	1	1890	1,000.00	998.39	1.61
Furniture, cases, and repairs	....do....... Apr. 4, 1890	25 26	839 42	1 1	1890	9,350.00	9,261.93	88.07
Library	Mar. 2, 1889	25	839	1	1890	2,000.00	1,738.28	261.72
Postage	....do.......	25	840	1	1890	4,000.00	4,000.00	....
Contingent expenses	....do....... Apr. 4, 1890	25 26	840 42	1 1	1890	20,000.00	19,965.32	34.68
Office of Experiment Stations	Mar. 2, 1889	25	840	1	1890	15,000.00	14,991.69	8.31
Experiments in the manufacture of sugar, including an unexpended balance of $58,364.76 from fiscal year 1889	....do.......	25	840	1	1890	83,364.76	83,064.14	300.62
Quarantine stations	....do.......	25	840	1	1890	15,000.00	11,266.24	3,733.76
Bureau of Animal industry	....do.......	25	839	1	1890	500,000.00	311,025.31	(1)
Silk culture, including $1,627.81 from sale of raw silk	....do.......	25	837	1	1890	21,627.81	21,626.10	1.71
Artesian wells	Apr. 4, 1890	26	42	1	1890	20,000.00	19,652.17	347.83
Salaries	July 14, 1890	26	282	1	1891	248,902.85	239,923.29	8,979.56
Collecting agricultural statistics	....do.......	26	284	1	1891	100,000.00	85,126.44	14,873.56
Botanical investigations	....do.......	26	284	1	1891	40,000.00	36,428.36	3,571.64
Investigating the history and habits of insects	....do....... July 28, 1892	26 27	285 296	1 1	1891	27,501.77	27,481.00	20.77
Ornithology and mammalogy	July 14, 1890 July 28, 1892	26 27	285 296	1 1	1891	14,004.90	13,003.67	1,001.23
Pomological information	July 14, 1890	26	285	1	1891	5,000.00	4,983.88	16.12
Microscopical investigations	....do.......	26	285	1	1891	5,000.00	3,281.90	1,718.10
Vegetable pathology	....do.......	26	235	1	1891	15,000.00	14,995.75	4.25
Laboratory	....do.......	26	286	1	1891	20,200.00	19,985.27	214.73
Forestry investigations	....do.......	26	286	1	1891	10,000.00	9,785.99	214.01
Illustrations and engravings	....do.......	26	286	1	1891	2,000.00	1,999.58	.42
Purchase and distribution of seeds	....do.......	26	286	1	1891	105,400.00	105,090.94	309.06
Document and folding room	....do.......	26	287	1	1891	2,000.00	1,995.53	4.47
Experimental gardens and grounds	....do.......	26	287	1	1891	28,500.00	28,396.41	103.59
Museum	....do.......	26	287	1	1891	4,000.00	3,832.28	167.72
Furniture, cases, and repairs	....do....... Mar. 3, 1891	26 26	287 1049	1 1	1891	12,000.00	11,991.01	8.99
Library	July 14, 1890	26	287	1	1891	3,000.00	2,997.20	2.80
Postage	....do.......	26	287	1	1891	5,000.00	4,833.00	167.00
Contingent expenses	....do.......	26	287	1	1891	20,000.00	18,097.13	1,902.87
Office of Experiment Stations	....do.......	26	288	1	1891	15,000.00	14,984.48	15.52
Experiments in the manufacture of sugar	....do....... Mar. 3, 1891	26 26	288 1050	1 1	1891	75,000.00	74,901.18	98.82
Irrigation investigations	Sept. 30, 1890	26	525	1	1891	40,000.00	39,926.67	73.33
Quarantine stations	July 14, 1890	26	288	1	1891	15,000.00	13,586.72	1,413.28
Bureau of Animal Industry, including an unexpended balance of $188,974.69 from fiscal year 1890	....do.......	26	287	1	1891	538,974.69	469,113.35	69,861.34
Silk culture, including $565 from sale of raw silk	....do.......	26	285	1	1891	20,565.00	19,536.33	1,028.67
Salaries	Mar. 3, 1891	26	1045	1	1892	256,800.00	252,766.17	4,033.83
Collecting agricultural statistics	....do.......	26	1046	1	1892	102,500.00	88,869.51	13,630.49
Botanical investigations	....do....... Aug. 23, 1894	26 28	1046 440	1 1	1892	40,246.40	40,246.40	....
Investigating the history and habits of insects	Mar. 3, 1891	26	1047	1	1892	27,800.00	27,780.03	19.97

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[1] Unexpended balance of $188,974.69 carried to fiscal year 1891.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Ornithology and mammalogy	Mar. 3, 1891	26	1047	1	1892	$15,000.00	$14,688.00	$312.00
Pomological information	do	26	1047	1	1892	5,000.00	4,985.27	14.73
Microscopical investigations	do	26	1047	1	1892	2,000.00	1,251.46	748.54
Vegetable pathology	do Aug. 23, 1894	26 28	1047 440	1 1	1892	15,076.47	15,076.47	....
Laboratory	Mar. 3, 1891	26	1047	1	1892	19,400.00	19,272.59	127.41
Fiber investigations	do	26	1048	1	1892	10,000.00	8,017.44	1,982.56
Forestry investigations	do Mar. 3, 1893	26 27	1048 660	1 1	1892	15,056.85	15,056.85	....
Illustrations and engravings	Mar. 3, 1891	26	1048	1	1892	2,000.00	1,999.85	.15
Purchase and distribution of seeds	do	26	1048	1	1892	105,400.00	104,920.35	479.65
Document and folding room	do	26	1049	1	1892	2,000.00	1,996.82	3.18
Experimental gardens and grounds	do Mar. 3, 1893	26 27	1049 660	1 1	1892	28,622.53	28,536.67	85.86
Museum	Mar. 3, 1891	26	1049	1	1892	4,000.00	3,909.17	90.83
Furniture, cases, and repairs	do	26	1049	1	1892	10,000.00	9,996.55	3.45
Library	do	26	1049	1	1892	3,000.00	2,807.75	192.25
Postage	do	26	1049	1	1892	5,000.00	4,900.00	100.00
Contingent expenses	do	26	1049	1	1892	25,000.00	24,762.32	237.68
Office of Experiment Stations	do	26	1050	1	1892	20,000.00	19,989.47	10.53
Experiments in the manufacture of sugar	do Mar. 18, 1892	26 27	1050 7	1 1	1892	35,000.00	34,627.78	372.22
Quarantine stations	Mar. 3, 1891	26	1050	1	1892	15,000.00	14,983.63	16.37
Bureau of Animal Industry	do Mar. 18, 1892	26 27	1050 7	1 1	1892	650,000.00	649,980.91	19.09
Weather Bureau	Mar. 3, 1891	26	1045	1	1892	889,753.50	861,840.83	27,912.67
Salaries	July 5, 1892	27	74	1	1893	256,800.00	253,896.30	2,903.70
Collecting agricultural statistics	do	27	76	1	1893	110,000.00	95,649.21	14,350.79
Botanical investigations and experiments	do	27	76	1	1893	27,500.00	27,451.55	48.45
Investigating the history and habits of insects	do	27	77	1	1893	17,800.00	17,290.80	509.20
Investigations in ornithology and mammalogy	do	27	77	1	1893	15,000.00	14,947.77	52.23
Pomological information	do	27	77	1	1893	5,000.00	4,745.94	254.06
Microscopical investigations	do	27	77	1	1893	2,000.00	1,982.98	17.02
Vegetable pathology	do	27	77	1	1893	20,000.00	19,977.38	22.62
Laboratory	do	27	77	1	1893	19,400.00	18,002.59	1,397.41
Fiber investigations	do	27	78	1	1893	5,000.00	4,997.07	2.93
Forest investigations	do	27	78	1	1893	12,000.00	11,933.39	66.61
Illustrations and engravings	do	27	78	1	1893	2,000.00	1,906.73	93.27
Purchase and distribution of seeds	do	27	78	1	1893	135,400.00	134,908.27	491.73
Document and folding room	do	27	78	1	1893	2,000.00	1,623.55	376.45
Experimental gardens and grounds	do	27	78	1	1893	28,500.00	28,115.09	384.91
Museum	do	27	79	1	1893	4,000.00	3,973.67	26.33
Furniture, cases, and repairs	do	27	79	1	1893	10,000.00	8,931.97	1,068.03
Library	do	27	79	1	1893	3,000.00	2,535.29	464.71
Postage	do	27	79	1	1893	5,000.00	3,705.00	1,295.00
Contingent expenses	do	27	79	1	1893	25,000.00	22,218.19	2,781.81
Experiment stations	do	27	80	1	1893	20,000.00	18,987.65	1,012.35
Experiments in the manufacture of sugar	do	27	80	1	1893	20,000.00	19,984.86	15.14
Irrigation investigations	do	27	76	1	1893	6,000.00	4,930.67	1,069.33
Quarantine stations	do	27	80	1	1893	15,000.00	12,633.23	2,366.77
Experiments in the production of rainfall	do	27	76	1	1893	10,000.00	4,979.59	5,020.41
Bureau of Animal Industry	do	27	79	1	1893	850,000.00	724,696.74	125,303.26
Weather Bureau	do	27	81	1	1893	913,660.72	890,424.77	23,235.95
Salaries	Mar. 3, 1893	27	734	1	1894	256,800.00	233,679.75	23,120.25
Collecting agricultural statistics	do	27	736 737	1	1894	110,000.00	91,080.20	18,919.80
Botanical investigations and experiments	do	27	737	1	1894	30,000.00	24,401.40	5,598.60
Investigating the history and habits of insects	do	27	737	1	1894	20,300.00	16,203.96	4,096.04
Investigations in ornithology and mammalogy	do	27	737	1	1894	17,500.00	17,450.00	50.00
Pomological information	do	27	738	1	1894	5,000.00	4,248.99	751.01
Microscopical investigations	do	27	738	1	1894	2,000.00	1,117.55	882.45
Vegetable pathology	do	27	738	1	1894	20,000.00	17,576.95	2,423.05
Laboratory	do	27	738	1	1894	21,900.00	10,426.79	11,473.21
Fiber investigations	do	27	738	1	1894	5,000.00	2,500.47	2,499.53

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Forestry investigations	Mar. 3, 1893	27	738	1	1894	$20,000.00	$19,995.96	$4.04
Illustrations and engravings	do	27	738	1	1894	2,000.00	664.79	1,335.21
Purchase and distribution of seeds	do	27	738	1	1894	135,400.00	119,719.76	15,680.24
Document and folding room	do	27	739	1	1894	2,000.00	1,662.81	337.19
Experimental gardens and grounds	do	27	739	1	1894	31,500.00	26,616.86	4,883.14
Museum	do	27	739	1	1894	4,000.00	2,787.22	1,212.78
Furniture, cases, and repairs	do	27	739	1	1894	10,000.00	8,628.76	1,371.24
Library	do	27	739	1	1894	3,000.00	2,900.07	99.93
Postage	do	27	740	1	1894	5,000.00	1,375.00	3,625.00
Contingent expenses	do	27	740	1	1894	25,000.00	20,493.04	4,506.96
Experiment stations	do	27	740	1	1894	25,223.50	22,381.85	2,841.65
Inquiries relating to public roads	do	27	737	1	1894	10,000.00	2,997.39	7,002.61
Experiments in the manufacture of sugar	do	27	741	1	1894	20,107.33	9,451.80	10,655.53
Irrigation investigations	do	27	741	1	1894	6,000.00	5,475.92	524.08
Quarantine stations	do	27	740	1	1894	15,000.00	6,263.92	8,736.08
Bureau of Animal Industry	do	27	740	1	1894	850,000.00	496,111.34	353,888.66
Weather Bureau	do	27	741	1	1894	951,124.75	811,256.73	139,868.02
Salaries	Aug. 18, 1894	28	266	1	1895	249,876.16	204,589.72	45,286.44
Collecting agricultural statistics	do	28	266	1	1895	110,000.00	95,125.67	14,874.33
Botanical investigations and experiments	do	28	267	1	1895	30,000.00	25,695.30	4,304.70
Investigating the history and habits of insects	do	28	267	1	1895	20,300.00	16,822.87	3,477.13
Investigations in ornithology, etc	do	28	267	1	1895	17,500.00	15,526.35	1,973.65
Pomological information	do	28	267	1	1895	5,000.00	4,920.23	79.77
Microscopical investigations	do	28	267	1	1895	2,000.00	313.87	1,686.13
Vegetable pathological investigations, etc	do	28	267	1	1895	20,000.00	19,063.69	936.31
Laboratory	do	28	267	1	1895	14,900.00	11,010.50	3,889.50
Fiber investigations	do	28	271	1	1895	5,000.00	3,973.81	1,026.19
Report on forestry	do	28	268	1	1895	20,000.00	19,908.23	91.77
Illustrations and engravings	do	28	268	1	1895	15,000.00	9,114.71	5,855.29
Purchase and distribution of valuable seeds	do	28	269	1	1895	165,400.00	120,545.15	44,854.85
Document and folding room	do	28	268	1	1895	2,000.00	1,166.83	833.17
Experimental gardens and grounds	do	28	268	1	1895	29,500.00	23,578.11	5,921.89
Museum	do	28	271	1	1895	3,000.00	1,889.73	1,110.27
Furniture, cases, and repairs	do	28	271	1	1895	10,000.00	7,952.27	2,047.73
Library	do	28	272	1	1895	6,000.00	5,963.20	36.80
Postage	do	28	271	1	1895	5,000.00	765.00	4,235.00
Nutrition investigations	do	28	271	1	1895	10,000.00	9,746.30	253.70
Contingent expenses	do	28	272	1	1895	25,000.00	20,452.79	4,547.21
Agricultural experiment stations	do	28	271	1	1895	25,000.00	24,928.22	71.78
Inquiries relating to public roads	do	28	266	1	1895	10,000.00	6,901.66	3,098.34
Experiments in the manufacture of sugar	do	28	271	1	1895	10,000.00	6,188.80	3,811.20
Irrigation investigations	do	28	271	1	1895	6,000.00	3,904.88	2,095.12
Quarantine stations for neat cattle	do	28	269	1	1895	12,000.00	6,262.17	5,737.83
Bureau of Animal Industry	do	28	269	1	1895	800,000.00	534,028.38	265,971.62
Weather Bureau	do	28	272	1	1895	878,438.84	820,691.94	57,746.90
Salaries	Mar. 2, 1895	28	727	1	1896	252,840.00	217,066.97	35,773.03
Collecting agricultural statistics	do	28	729	1	1896	110,000.00	68,628.99	41,371.01
Inquiries relating to public roads	do	28	729	1	1896	10,000.00	9,568.39	431.61
Botanical investigations and experiments	do	28	730	1	1896	25,000.00	20,325.37	4,674.63
Investigating the history and habits of insects	do	28	730	1	1896	20,000.00	17,372.43	2,627.57
Investigations in ornithology and mammalogy	do	28	730	1	1896	17,500.00	16,175.45	1,324.55
Pomological information	do	28	730	1	1896	6,000.00	4,996.41	1,003.59
Microscopical investigations	do	28	730	1	1896	2,000.00	....	2,000.00
Vegetable pathological investigations and experiments	do	28	730	1	1896	20,000.00	18,539.18	1,460.82
Laboratory	do	28	730	1	1896	14,900.00	11,458.53	3,441.47

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Report on forestry	Mar. 2, 1895	28	731	1	1896	$25,000.00	$18,398.12	$6,601.88
Illustrations and engravings	do	28	731	1	1896	15,000.00	12,985.71	2,014.29
Document and folding room	do	28	731	1	1896	2,000.00	1,061.23	938.77
Experimental gardens and grounds	do	28	731	1	1896	29,500.00	22,371.15	7,128.85
Quarantine stations for neat cattle	do	28	733	1	1896	12,000.00	6,492.05	5,507.95
Purchase and distribution of valuable seeds	do	28	733	1	1896	185,400.00	126,476.87	58,923.13
Experiments in the manufacture of sugar	do	28	734	1	1896	10,000.00	1,510.94	8,489.06
Agricultural experiment stations ($750,000[1])	do	28	734	1	1896	[2] 30,143.75	27,712.86	2,430.89
Irrigation investigations	do	28	735	1	1896	15,000.00	5,029.82	9,970.18
Nutrition investigations	do	28	735	1	1896	15,000.00	14,892.96	107.04
Investigations and experiments with grasses and forage plants	do	28	735	1	1896	15,000.00	13,329.47	1,670.53
Investigations in relation to agricultural soils	do	28	735	1	1896	15,000.00	13,524.84	1,475.16
Furniture, cases, and repairs	do	28	735	1	1896	10,000.00	8,645.98	1,354.02
Postage	do	28	735	1	1896	2,000.00	1,215.00	785.00
Museum	do	28	735	1	1896	3,000.00	2,161.90	838.10
Fiber investigations	do	28	735	1	1896	5,000.00	3,710.36	1,289.64
Library	do	28	735	1	1896	6,000.00	5,431.92	568.08
Contingent expenses	do	28	736	1	1896	25,000.00	15,912.71	9,087.29
Bureau of Animal Industry	do	28	731	1	1896	800,000.00	595,336.64	204,663.36
Weather Bureau	do	28	736	1	1896	[3] 885,729.47	814,584.17	71,145.30
Salaries	Apr. 25, 1896	29	99	1	1897	313,860.00	290,791.95	23,068.05
Furniture, cases, and repairs	do	29	105	1	1897	12,000.00	9,567.59	2,432.41
Library	do	29	104	1	1897	7,000.00	6,831.15	168.85
Museum	do	29	105	1	1897	3,000.00	2,895.45	104.55
Postage	do	29	105	1	1897	3,000.00	1,730.00	1,270.00
Contingent expenses	do	29	105	1	1897	25,000.00	22,980.29	2,019.71
Animal quarantine stations	do	29	105	1	1897	12,000.00	6,564.19	5,435.81
Collecting agricultural statistics	do	29	101	1	1897	110,000.00	83,067.62	26,932.38
Botanical investigations and experiments	do	29	101	1	1897	15,000.00	14,999.64	.36
Entomological investigations	do	29	102	1	1897	20,000.00	18,637.01	1,362.99
Vegetable pathological investigations	do	29	102	1	1897	20,000.00	19,274.15	725.85
Biological investigations	do	29	102	1	1897	17,500.00	17,483.05	16.95
Pomological investigations	do	29	102	1	1897	6,000.00	4,981.52	1,018.48
Laboratory	do	29	102	1	1897	12,400.00	10,800.18	1,599.82
Forestry investigations	do	29	103	1	1897	20,000.00	19,514.88	485.12
Experimental gardens and grounds	do	29	103	1	1897	20,000.00	19,483.28	516.72
Soil investigations	do	29	103	1	1897	10,000.00	9,868.16	131.84
Grass and forage plant investigations	do	29	103	1	1897	10,000.00	9,203.14	796.86
Fiber investigations	do	29	103	1	1897	5,000.00	4,143.00	857.00
Agricultural experiment stations ($750,000[1])	do	29	103	1	1897	[4] 30,127.25	29,171.57	955.68
Nutrition investigations	do	29	104	1	1897	15,000.00	14,821.64	178.36
Public road inquiries	do	29	104	1	1897	8,000.00	7,873.97	126.03
Publications	do	29	104	1	1897	70,000.00	67,709.89	2,290.11
Purchase and distribution of valuable seeds	do	29	106	1	1897	150,000.00	142,822.52	7,177.48
Bureau of Animal Industry	do	29	106	1	1897	650,000.00	642,715.68	7,284.32
Weather Bureau	do	29	107	1	1897	[5] 883,876.28	870,581.46	13,294.82
Salaries, officers and clerks	Apr. 23, 1897	30	1	1	1898	319,300.00	285,181.30 18,962.98 9,811.02	5,118.70 37.02 188.98
Furniture, cases, and repairs	do	30	8	1	1898	9,000.00	7,851.30	1,148.70
Library	do	30	7	1	1898	7,000.00	6,734.81	265.19
Museum	do	30	8	1	1898	3,000.00	2,906.02	93.98
Postage	do	30	8	1	1898	3,000.00	1,500.00	1,500.00
Contingent expenses	do	30	8	1	1898	25,000.00	22,061.73	2,938.27

[1] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department.

[2] Includes $143.75 from the sale of card index.

[3] Includes $119.47 from the sale of Weather Bureau publications.

[4] Includes $127.25 from the sale of card index.

[5] Includes $104.28 from the sale of Weather Bureau publications.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Animal quarantine stations	Apr. 23, 1897	30	7	1	1898	$12,000.00	$10,897.98	$1,102.02
Collecting agricultural statistics	do	30	3	1	1898	110,000.00	92,896.01 9,021.09	7,103.99 978.91
Botanical investigations and experiments	do	30	4	1	1898	15,000.00	14,714.50	285.50
Entomological investigations	do	30	4	1	1898	20,000.00	19,735.02	264.98
Vegetable pathological investigations	do	30	4	1	1898	20,000.00	18,966.67 660.00	373.33 ....
Biological investigations	do	30	4	1	1898	17,500.00	16,160.90	1,339.10
Pomological investigations	do	30	4	1	1898	8,000.00	7,487.93	512.07
Laboratory	do	30	5	1	1898	12,400.00	3,913.86 900.00 6,718.71	86.14 .... 781.29
Forestry investigations	do	30	5	1	1898	20,000.00	19,831.32	168.68
Experimental gardens and grounds	do	30	5	1	1898	25,000.00	24,937 31	62.69
Soil investigations	do	30	5	1	1898	10,000.00	9,199.82 660.00	140.18 ....
Grass and forage plant investigations	do	30	6	1	1898	10,000.00	8,877.68	1,122.32
Fiber investigations	do	30	6	1	1898	5,000.00	3,659.05	1,340.95
Agricultural experiment stations ($755,000[1])	do	30	6	1	1898	35,000.00	29,413.10 4,925.80	586.90 74.20
Nutrition investigations	do	30	6	1	1898	15,000.00	14,872.88	127.12
Public road inquiries	do	30	7	1	1898	8,000.00	7,978.44	21.56
Publications, including Farmers' Bulletins	do	30	7	1	1898	65,000.00	34,966.55 29,812.59	33.45 187.41
Investigating production of domestic sugar	do	30	39	1	1898	5,000.00	4,941.32	58.68
Purchase and distribution of valuable seeds	do	30	8	1	1898	130,000.00	121,870.38	8,129.62
Salaries and expenses, Bureau of Animal Industry	do	30	9	1	1898	675,000.00	673,444.02 1,200.00	365.98 ....
Weather Bureau	do	30	9	1	1898	883,702.00	877,838.35	5,863.65
Salaries, officers and clerks	Mar. 22, 1898	30	330	1	1899	319,300.00	315,986.70	3,313.30
Furniture, cases, and repairs	do	30	336	1	1899	9,000.00	8,667.75	332.25
Library	do	30	336	1	1899	6,000.00	5,659.51	340.49
Museum	do	30	336	1	1899	1,500.00	1,465.36	34.64
Postage	do	30	336	1	1899	2,000.00	2,000.00	....
Contingent expenses	do	30	337	1	1899	25,000.00	23,888.08	1,111.92
Animal quarantine stations	do	30	336	1	1899	12,000.00	11,833.38	166.62
Collecting agricultural statistics	do	30	333	1	1899	105,000.00	100,952.48	4,047.52
Botanical investigations and experiments	do	30	333	1	1899	20,000.00	19,972.07	27.93
Entomological investigations	do	30	333	1	1899	20,000.00	19,812.64	187.36
Vegetable pathological investigations	do	30	333	1	1899	20,000.00	19,634.32	365.68
Biological investigations	do	30	334	1	1899	17,500.00	17,373.26	126.74
Pomological investigations	do	30	334	1	1899	9,500.00	8,248.18	1,251.82
Laboratory	do	30	334	1	1899	12,400.00	12,028.15	371.85
Forestry investigations	do	30	334	1	1899	20,000.00	19,520.52	469.48
Experimental gardens and grounds	do	30	334	1	1899	20,000.00	19,879.66	120.34
Soil investigations	do	30	334	1	1899	10,000.00	9,885.85	114.15
Grass and forage plant investigations	do	30	335	1	1899	10,000.00	9,950.99	49.01
Irrigation information	do	30	335	1	1899	10,000.00	9,997.49	2.51
Agricultural experiment stations ($760,000[1])	do	30	335	1	1899	40,000.00	39,536.38	463.62
Nutrition investigations	do	30	335	1	1899	15,000.00	14,903.08	96.92
Public road inquiries	do	30	336	1	1899	8,000.00	7,469.50	530.50
Publications	do	30	336	1	1899	65,000.00	64,773.62	226.38
Purchase and distribution of valuable seeds	do	30	337	1	1899	130,000.00	128,350.61	1,649.39
Investigating production of domestic sugar	do	30	338	1	1899	7,000.00	6,860.30	139.70
Salaries and expenses, Bureau of Animal Industry	do	30	338	1	1899	900,000.00	[2] 920,164.47	6,828.45
Weather Bureau	do	30	339	1	1899	1,015,502.00	1,008,971.30	6,530.70
Salaries, officers and clerks	Mar. 1, 1899	30	947	1	1900	336,340.00	330,666.24	5,673.76

[1] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department.

[2] Includes $26,992.92 received from sale of American products in Europe.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Furniture, cases, and repairs	Mar. 1, 1899	30	955	1	1900	$10,000.00	$9,771.27	$228.73
Library	do	30	954	1	1900	5,000.00	4,291.17	708.83
Museum	do	30	954	1	1900	1,500.00	1,490.01	9.99
Postage	do	30	954	1	1900	2,000.00	2,000.00	.....
Contingent expenses	do	30	955	1	1900	25,000.00	23,769.38	1,230.62
Animal quarantine stations	do	30	954	1	1900	12,000.00	11,477.87	522.13
Collecting agricultural statistics	do	30	950	1	1900	110,000.00	107,653.62	2,346.38
Botanical investigations and experiments	do	30	950	1	1900	20,000.00	19,689.51	310.49
Entomological investigations	do	30	951	1	1900	20,000.00	19,920.64	79.36
Vegetable pathological investigations	do	30	951	1	1900	26,000.00	25,854.44	145.56
Biological investigations	do	30	951	1	1900	17,500.00	17,344.00	156.00
Pomological investigations	do	30	951	1	1900	9,500.00	9,099.61	400.39
Laboratory	do	30	951	1	1900	17,700.00	17,182.80	517.20
Forestry investigations	do	30	952	1	1900	40,000.00	39,991.49	8.51
Experimental gardens and grounds	do	30	952	1	1900	28,000.00	27,589.66	410.34
Soil investigations	do	30	952	1	1900	20,000.00	19,717.02	282.98
Grass and forage plant investigations	do	30	952	1	1900	12,000.00	11,566.84	433.16
Irrigation investigations	do	30	953	1	1900	35,000.00	33,732.57	1,267.43
Agricultural experiment stations ($765,000[1])	do	30	953	1	1900	45,000.00	43,702.20	1,297.80
Nutrition investigations	do	30	953	1	1900	15,000.00	14,950.86	49.14
Public road inquiries	do	30	954	1	1900	8,000.00	7,854.35	145.65
Publications	do	30	954	1	1900	80,000.00	79,516.76	483.24
Purchase and distribution of valuable seeds	do	30	955	1	1900	130,000.00	128,366.13	1,633.87
Investigating production of domestic sugar	do	30	956	1	1900	7,000.00	6,717.82	282.18
Tea-culture investigations	do	30	956	1	1900	1,000.00	999.33	.67
Salaries and expenses, Bureau of Animal Industry	do	30	956	1	1900	950,000.00	918,449.03	31,550.97
Weather Bureau	do	30	957	1	1900	1,022,482.00	1,014,238.80	8,243.20
Salaries, officers and clerks	May 20, 1900	31	191	1	1901	326,680.00	319,809.25	6,870.75
Library	do	31	194	1	1901	5,000.00	4,118.93	881.07
Contingent expenses	do	31	194	1	1901	37,000.00	35,623.95	1,376.05
Animal quarantine stations	do	31	194	1	1901	50,000.00	49,343.52	656.48
Collecting agricultural statistics	do	31	194	1	1901	110,000.00	109,729.76	270.24
Botanical investigations and experiments	do	31	195	1	1901	30,000.00	29,590.49	409.51
Entomological investigations	do	31	195	1	1901	22,500.00	22,265.57	234.43
Vegetable pathological investigations	do	31	195	1	1901	28,000.00	27,488.57	511.43
Biological investigations	Mar. 1, 1899	31	196	1	1901	17,500.00	17,195.83	304.17
Pomological investigations	do	31	196	1	1901	9,500.00	9,315.11	184.89
Laboratory	do	31	196	1	1901	28,500.00	28,395.45	104.55
Forestry investigations	do	31	197	1	1901	80,000.00	79,695.87	304.13
Experimental gardens and grounds	do	31	197	1	1901	20,000.00	19,986.72	13.28
Soil investigations	do	31	197	1	1901	25,000.00	24,924.94	75.06
Grass and forage plant investigations	do	31	198	1	1901	17,000.00	15,225.83	1,774.17
Irrigation investigations	do	31	199	1	1901	50,000.00	49,973.09	26.91
Agricultural experiment stations ($780,000[2])	do	31	198	1	1901	[2]60,251.01	59,883.47	367.54
Nutrition investigations	do	31	199	1	1901	17,500.00	17,499.67	.33
Arlington experimental farm	do	31	199	1	1901	10,000.00	9,946.03	53.97
Public road inquiries	do	31	200	1	1901	14,000.00	13,990.76	9.24
Publications	do	31	200	1	1901	105,000.00	104,680.67	319.33
Purchase and distribution of valuable seeds	do	31	200	1	1901	170,000.00	149,615.49	20,384.51
Investigating production of domestic sugar	do	31	201	1	1901	7,000.00	6,690.25	309.75
Tea-culture investigations	do	31	202	1	1901	5,000.00	4,959.42	40.58
Salaries and expenses, Bureau of Animal Industry	do	31	202	1	1901	[3]1,000,514.96	976,566.75	23,948.21
Salaries, Weather Bureau	do	31	202	1	1901	153,320.00	152,688.11	631.89
Fuel, lights, and repairs, Weather Bureau	do	31	203	1	1901	9,000.00	8,877.36	122.64

[1] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department.

[2] Including $251.01 received from sales of card index.

[3] Including $514.96 received from sales of American butter in foreign markets.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Contingent expenses, Weather Bureau	Mar. 1, 1899	31	203	1	1901	$8,000.00	$7,906.40	$93.60
General expenses, Weather Bureau	do	31	203	1	1901	828,000.00	823,921.78	4,078.22
Meteorological observation stations, Weather Bureau	do	31	204	1	1901	60,000.00	59,019.49	980.51
Salaries	Mar. 2, 1901	31	922	1	1902	373,820.00	370,039.69	3,780.31
Library	do	31	934	1	1902	7,000.00	6,754.06	245.94
Contingent expenses	do	31	934	1	1902	37,000.00	34,543.24	2,456.76
Animal quarantine stations	do	31	926	1	1902	25,000.00	24,814.88	185.12
Collecting agricultural statistics	do	31	934	1	1902	120,000.00	117,060.06	2,939.94
Botanical investigations and experiments	do	31	928	1	1902	45,000.00	44,950.93	49.07
Entomological investigations	do	31	931	1	1902	28,513.18	27,069.77	1,443.41
Vegetable pathological investigations	do	31	927	1	1902	60,000.00	59,999.45	.55
Biological investigations	do	31	932	1	1902	20,000.00	19,807.80	192.20
Pomological investigations	do	31	927	1	1902	20,000.00	19,985.14	14.86
Laboratory	do	31	930	1	1902	24,500.00	24,417.47	82.53
Forestry investigations	do	31	929	1	1902	146,280.00	145,809.76	470.24
Experimental gardens and grounds	do	31	929	1	1902	20,000.00	19,725.80	274.20
Soil investigations	do	31	931	1	1902	91,000.00	89,987.21	1,012.79
Grass and forage plant investigations	do	31	928	1	1902	20,000.00	19,566.91	433.09
Irrigation investigations	do	31	936	1	1902	50,000.00	49,980.86	19.14
Agricultural experiment stations ($780,000 [1])	do	31	935	1	1902	[2] 69,157.05	69,052.71	104.34
Nutrition investigations	do	31	936	1	1902	20,000.00	19,951.48	48.52
Arlington experimental farm	do	31	936	1	1902	10,000.00	9,897.16	102.84
Plans for building Department of Agriculture, 1901-2	do	31	938	1	1902	5,000.00	5,000.00	....
Public road inquiries	do	31	938	1	1902	20,000.00	19,957.01	42.99
Publications	do	31	933	1	1902	188,000.00	187,657.52	342.48
Purchase and distribution of valuable seeds	do	31	937	1	1902	270,000.00	266,614.22	3,385.78
Investigating production of domestic sugar	do	31	936	1	1902	5,000.00	4,346.31	653.69
Tea-culture investigations	do	31	937	1	1902	7,000.00	6,816.25	183.75
Bureau of Animal Industry	do	31	925	1	1902	1,092,190.28	1,092,100.94	89.34
Weather Bureau:								
Salaries	do	31	923	1	1902	159,820.00	159,769.71	50.59
Fuel, lights, and repairs	do	31	923	1	1902	9,000.00	8,919.71	80.29
Contingent expenses	do	31	923	1	1902	8,000.00	7,942.81	57.19
General expenses	do	31	923	1	1902	865,500.00	864,490.74	1,009.26
Meteorological observation stations	do	31	924	1	1902	60,000.00	59,646.49	353.51
Buildings	do	31	924	1	1902	46,000.00	46,000.00	....
Salaries	June 3, 1902	32	286	1	1903	465,500.00	450,976.17	14,523.83
Library	do	32	300	1	1903	8,000.00	7,635.11	364.89
Contingent expenses	do	32	301	1	1903	37,000.00	42,916.14	83.86
Urgent deficiency, contingent	do	32	1062	1	1903	6,000.00		
Vegetable pathological investigations	do	32	291	1	1903	105,000.00	103,646.28	1,353.72
Vegetable pathological investigations, 1902-3	do	32	1152	1	1903	5,000.00	4,130.02	869.98
Pomological investigations	do	32	291	1	1903	30,000.00	29,606.83	393.17
Botanical investigations and experiments	do	32	292	1	1903	55,000.00	54,900.42	99.58
Grass and forage plant investigations	do	32	292	1	1903	30,000.00	29,527.41	472.59
Experimental gradens and grounds	do	32	293	1	1903	25,000.00	24,935.74	64.26
Arlington Experimental Farm	do	32	293	1	1903	15,000.00	14,998.81	1.19
Investigating production of domestic sugar	do	32	295	1	1903	5,000.00	4,065.10	934.90
Tea-culture investigations	do	32	293	1	1903	10,000.00	7,500.10	2,499.90
Purchase and distribution of valuable seeds	do	32	293	1	1903	270,000.00	266,229.81	3,770.19
Forestry investigations	do	32	295	1	1903	254,000.00	244,781.68	9,218.32
Laboratory	do	32	296	1	1903	60,500.00	59,518.91	918.09

[1] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department

[2] Including $157.05 received from sales of card index.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Soil investigations	June 3, 1902	32	297	1	1903	$130,000.00	$128,408.15	$1,591.85
Entomological investigations	do	32	298	1	1903	37,500.00	37,485.44	14.56
Entomological investigations, 1902–3	do	32	298	1	1903	8,000.00	7,989.42	10.58
Biological investigations	do	32	298	1	1903	26,000.00	25,616.80	383.20
Biological investigations, 1902–3	do	32	298	1	1903	2,000.00	1,949.61	50.39
Urgent deficiency, publications	do	32	1062	1	1903	200,000.00 4,000.00	190,961.49	13,038.51
Collecting agricultural statistics	do	32	300	1	1903	94,200.00	94,023.27	176.73
Agricultural experiment stations ($796,000 [1])	do	32	301	1	1903	76,000.00	77,552.69	333.31
Amount of deposits	do	32	301	1	1903	[2] 1,886.00		
Nutrition investigations	do	32	302	1	1903	20,000.00	19,901.12	98.88
Irrigation investigations	do	32	302	1	1903	65,000.00	62,201.12	2,798.88
Public road inquiries	do	32	302	1	1903	30,000.00	29,996.13	3.87
Foreign market investigations	do	32	300	1	1903	6,500.00	6,140.02	359.98
Silk investigations	do	32	303	1	1903	10,000.00	7,133.32	2,866.68
Expenses, Bureau of Animal Industry	do	32	289	1	1903	1,660,000.00	1,444,113.05	215,886.95
Urgent deficiency, Bureau of Animal Industry	do	32	1165	1	1903	500,000.00		
Weather Bureau:								
Salaries	do	32	286	1	1903	165,260.00	164,927.46	332.54
Fuel, lights, and repairs	do	32	287	1	1903	10,000.00	9,964.65	35.35
Contingent expenses	do	32	287	1	1903	8,000.00	7,806.38	193.62
General expenses	do	32	287	1	1903	915,000.00	428,219.24 480,377.71	1,280.76 5,622.29
Meteorological observation stations	do	32	288	1	1903	60,000.00	59,628.24	371.76
Buildings	do	32	288	1	1903	50,000.00	49,467.00	533.00
Cables and land lines	do	32	288	1	1903	40,000.00	40,000.00	....
Storm-warning stations, Glenhaven and South Manitou Island, Mich	do	32	288	1	1903	15,000.00	15,000.00	....
Salaries, Department of Agriculture, officers and clerks	Mar. 3, 1903	32	1147	1	1904	470,080.00	458,295.90	11,784.10
Salaries, extra laborers	do	32	1147	1	1904	1,000.00	982.01	17.99
Bureau of Animal Industry:								
General expenses, including $1,800 for rent of building	do	32	1150	1	1904	1,200,000.00	1,199,410.98	589.02
To eradicate contagious diseases of animals	do	....	......	...	......	250,000.00	249,868.64	131.06
Bureau of Plant Industry:								
Vegetable pathological investigations	do	32	1152	1	1904	122,000.00	122,889.98	.06
Rent of building	do	32	1152	1	1904	3,000.00	2,109.96	
Vegetable pathological investigations, 1903–4	do	32	1152	1	1904	5,000.00	4,998.41	1.59
Pomological investigations	do	32	1153	1	1904	37,000.00	35,636.08	1,363.92
Botanical investigations and experiments	do	32	1153	1	1904	62,000.00	60,693.23	1,306.77
Rent of building	do	32	1153	1	1904	3,000.00	3,000.00	....
Grass and forage plant investigations	do	32	1154	1	1904	33,800.00	34,514.48	235.52
Rent of building	do	32	1154	1	1904	1,200.00	250.00	
Experimental gardens and grounds, Department of Agriculture	do	32	1154	1	1904	25,000.00	24,984.11	15.89
Arlington Experimental Farm	do	22	1155	1	1904	15,000.00	14,972.99	27.01
Tea-culture investigations	do	32	1155	1	1904	10,000.00	8,701.07	1,298.93
Purchase and distribution of valuable seeds	do	32	1155	1	1904	257,000.00	257,247.74	256.26
Foreign seed and plant introduction	do	32	1155	1	1904	30,000.00	27,483.93	2,012.07
Rent of building	do	32	1156	1	1904	3,000.00	....	3,000.00
Investigating production of domestic sugar	do	32	1156	1	1904	5,000.00	4,249.41	750.59

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[1] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department.

[2] Receipts from sales of certain products of Alaska, Hawaii, and Porto Rico experiment stations.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Bureau of Forestry:								
Forestry investigations, including $10,000 for rent of building	Mar. 3, 1903	32	1156	1	1904	$312,860.00	$311,588.63	$1,271.37
Protection of forest reserves[1]	do	....	......	...	......	16,864.01	341.12	16,522.89
Bureau of Chemistry:								
Laboratory, including $5,000 for table sirup	do	32	1157	1	1904	60,500.00	60,317.39	182.61
Laboratory, table sirup, 1903-4	do	32	1157	1	1904	10,000.00	9,898.89	101.11
Bureau of Soils, including $2,000 for rent of building	do	32	1159	1	1904	170,000.00	166,286.32	3,713.68
Entomological investigations	do	32	1160	1	1904	43,500.00	39,114.76	4,385.24
Silk investigations	do	32	1160	1	1904	10,000.00	9,055.31	944.69
Entomological investigations, 1903-4	do	32	1160	1	1904	12,000.00	11,825.82	174.18
Biological investigations, including $1,000 for care of game	do	32	1160	1	1904	34,000.00	33,066.92	933.08
Publications, Department of Agriculture, Farmers' Bulletins	do	32	1161	1	1904	105,000.00	104,997.90	2.10
Artists, etc	do	32	1161	1	1904	10,000.00	9,992.49	7.51
Labor, etc	do	32	1161	1	1904	85,000.00	84,746.73	253.27
Collecting agricultural statistics	do	32	1162	1	1904	104,200.00	103,225.90	974.10
Collecting agricultural statistics, 1903-4	do	32	1162	1	1904	5,000.00	4,996.84	3.16
Foreign market investigations	do	32	1162	1	1904	7,500.00	7,455.40	44.60
Library, Department of Agriculture	do	32	1163	1	1904	10,000.00	9,972.93	27.07
Contingent expenses, Department of Agriculture	do	32	1163	1	1904	37,000.00	36,999.77	.23
Agricultural experiment stations ($810,000[2])	do	32	1163	1	1904	40,000.00	39,997.74	2.26
Stations of Alaska	do	32	1164	1	1904	15,000.00	15,000.00	....
Stations of Hawaii	do	32	1164	1	1904	15,000.00	15,000.00	....
Stations of Porto Rico	do	32	1164	1	1904	15,000.00	15,000.00	....
Farmers' institutes	do	32	1164	1	1904	5,000.00	4,838.69	161.31
Nutrition investigations	do	32	1164	1	1904	20,000.00	19,994.18	5.82
Irrigation investigations	do	32	1165	1	1904	65,000.00	64,938.65	61.35
Public road inquiries	do	32	1165	1	1904	32,000.00	31,813.00	187.00
Public road inquiries, 1903-4	do	32	1165	1	1904	3,000.00	3,000.00	....
Weather Bureau:								
Salaries	do	32	1148	1	1904	175,440.00	175,098.94	341.06
Fuel, lights, and repairs	do	32	1148	1	1904	6,000.00	5,981.63	18.37
Contingent expenses	do	32	1148	1	1904	8,000.00	7,818.52	181.48
General expenses, salaries	do	32	1149	1	1904	472,300.00	471,917.22	382.78
General expenses, miscellaneous	do	32	1149	1	1904	496,780.00	494,741.03	2,038.97
Buildings	do	32	1149	1	1904	50,000.00	50,000.00	....
Cables and land lines	do	32	1149	1	1904	40,000.00	40,000.00	....
Salaries, officers and clerks	Apr. 23, 1904	33	276	1	1905	481,300.00	407,998.89	10,301.11
Salaries, extra laborers	do	33	277	1	1905	1,000.00	971.66	28.34
Bureau of Animal Industry:								
Deficiency appropriation	do	33	1242	1	1905	150,000.00	1,399,227.96	772.04
General expenses, including $1,800 for rent of building	do	33	279	1	1905	1,250,000.00		
Animal breeding and feeding	do	33	281	1	1905	25,000.00	20,540.67	4,459.33
To eradicate contagious diseases of animals, 1904-5[3]	do	33	5	1	1905	250,000.00	248,980.79	1,019.21
Bureau of Plant Industry:								
Vegetable pathological investigations	do	33	281	1	1905	145,000.00	145,705.01	....
Rent of building	do	33	281	1	1905	3,000.00	2,294.99	
Vegetable pathological investigations, 1904-5	do	33	281	1	1905	2,000.00	2,000.00	....
Rent of quarters (deficiency)	do	33	603	1	1905	2,500.00	2,485.00	15.00
Pomological investigations[4]	do	33	282	1	1905	43,500.00	41,280.58	2,219.42

[1] This appropriation and amount transferred from Department of Interior.

[2] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department.

[3] By transfer from cotton-boll weevil to Bureau of Animal Industry, 1904-5, $3,500.0

[4] By receipts from sale of fruits and vegetables (pomological investigations), $2,426.21.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Bureau of Plant Industry—Con.								
Botanical investigations and experiments	Apr. 23, 1904	33	283	1	1905	$64,500.00	$63,914.24	$585.76
Rent of building	do	33	283	1	1905	3,000.00	3,000.00	....
Grass and forage plant investigations	do	33	283	1	1905	40,500.00	40,012.04	487.96
Rent of building	do	33	283	1	1905	2,000.00	1,500.00	500.00
Experimental gardens and grounds, Department of Agriculture	do	33	284	1	1905	25,000.00	24,725.40	274.60
Greenhouses, Department of Agriculture, 1904–5	do	33	284	1	1905	25,000.00	24,995.32	4.68
Arlington Experimental Farm	do	33	284	1	1905	20,000.00	19,838.70	161.30
Tea-culture investigations	do	33	284	1	1905	10,000.00	8,387.15	1,612.85
Purchase and distribution of valuable seeds [1]	do	33	285	1	1905	242,500.00	240,379.71	2,120.29
Foreign seed and plant introduction [1]	do	33	286	1	1905	40,000.00	39,687.44	312.56
Repairs to building	do	33	285	1	1905	7,500.00	4,000.00	3,500.00
Investigating production of domestic sugar	do	33	286	1	1905	7,500.00	7,222.14	277.86
Bureau of Forestry:								
Forestry investigations, including $15,500 for rent of building	do	33	286	1	1905	388,000.00	386,618.32	1,381.68
Protection of forest reserves	do	33	286	1	1905	50,000.00	49,025.23	974.77
Testing timbers, Louisiana Purchase Exposition, St. Louis, Mo. (deficiency act)	do	33	1242	1	1905	10,000.00	9,985.82	14.18
Bureau of Chemistry:								
Laboratory, including $15,000 for table sirup	do	33	287	1	1905	105,000.00	103,693.95	1,306.05
Laboratory, 1904–5	do	33	288	1	1905	15,000.00	14,716.95	283.05
Laboratory road materials	do	33	288	1	1905	15,000.00	14,802.99	197.01
Bureau of Soils:								
Soil investigations, including $6,000 for rent of building	do	33	288	1	1905	170,000.00	168,638.84	1,361.16
Entomological investigations	do	33	289	1	1905	70,000.00	69,124.44	875.56
Cotton-boll weevil investigations, 1904–5 [2]	do	33	5	1	1905	250,000.00	220,685.40	29,314.60
Biological investigations	do	33	290	1	1905	33,000.00	32,937.70	62.30
Biological investigations, 1904–5, care of elk	do	33	291	1	1905	1,000.00	807.14	192.86
Publications, Department of Agriculture, Farmers' Bulletins	do	33	291	1	1905	105,000.00	104,885.16	114.84
Artists, etc	do	33	291	1	1905	15,000.00	14,635.28	364.72
Labor, etc	do	33	291	1	1905	89,000.00	88,985.64	14.36
Labor, etc., 1904–5	do	33	291	1	1905	1,000.00	430.64	569.36
Collecting agricultural statistics	do	33	292	1	1905	132,000.00	130,539.73	1,460.27
Foreign-market investigations	do	33	292	1	1905	7,500.00	6,069.72	1,430.28
Library, Department of Agriculture	do	33	293	1	1905	10,000.00	9,640.28	359.72
Contingent expenses, Department of Agriculture	do	33	293	1	1905	37,000.00	36,963.20	36.80
Agricultural experiment stations ($810,000 [3])	do	33	293	1	1905	40,000.00	39,703.10	296.90
Stations of Alaska	do	33	294	1	1905	15,000.00	15,000.00	....
Stations of Hawaii	do	33	294	1	1905	15,000.00	15,000.00	....
Stations of Porto Rico	do	33	294	1	1905	15,000.00	15,000.00	....
Farmers' institutes	do	33	294	1	1905	5,000.00	4,603.53	396.47
Nutrition investigations	do	33	294	1	1905	20,000.00	19,976.98	23.02
Irrigation investigations	do	33	294	1	1905	67,500.00	67,416.35	83.65
Public road inquiries	do	33	295	1	1905	35,000.00	34,319.03	680.97
Building, Department of Agriculture	do	32	806	1	1905	250,000.00	108,496.32	141,503.68

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[1] By transfer from foreign to domestic seeds, $4,183.54.

[2] By transfer from cotton-boll weevil to Bureau of Animal Industry, 1904–5, $3,500.

[3] Of this amount $720,000 was paid directly to the experiment stations from the Treasury Department.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Weather Bureau:								
Salaries	Apr. 23, 1904	33	277	1	1905	$180,440.00	$180,225.57	$214.43
Fuel, lights, and repairs	do	33	278	1	1905	8,000.00	7,979.20	20.80
Contingent expenses	do	33	278	1	1905	10,000.00	9,702.60	297.40
General expenses, salaries	do	33	278	1	1905	492,300.00	491,725.31	574.69
General expenses, miscellaneous	do	33	279	1	1905	572,000.00	569,424.01	2,575.99
Buildings	do	33	279	1	1905	48,000.00	47,803.11	196.89
Cables and land lines	do	33	279	1	1905	27,000.00	26,991.09	8.91
Salaries, officers and clerks	Mar. 3, 1905	33	861	1	1906	804,970.00	783,042.64	21,927.36
Salaries, extra labor	do	33	861	1	1906	10,000.00	9,120.34	879.66
Bureau of Animal Industry:								
Deficiency act	Feb. 27, 1906	....	......	...	1906	....	....	....
General expenses (including $63,000 deficiency)	Mar. 3, 1905	33	864	1	1906	1,492,020.00	1,405,951.28	86,068.72
Animal breeding and feeding	do	33	866	1	1906	25,000.00	24,429.56	570.44
Rent of buildings	do	33	865	1	1906	2,500.00	1,802.00	698.00
Bureau of Plant Industry:								
Vegetable pathological investigations	do	33	867	1	1906	139,640.00	135,320.51	4,319.49
Rent of building	do	33	867	1	1906	6,000.00	3,720.00	2,280.00
Vegetable pathological investigations, 1905–6	do	33	868	1	1906	10,000.00	9,560.46	439.54
Grain investigations	do	33	868	1	1906	25,000.00	23,843.68	1,156.32
Pomological investigations	do	33	868	1	1906	33,640.00	33,639.62	.38
Rent of building	do	33	868	1	1906	2,000.00	2,000.00	....
Botanical investigations and experiments	do	33	869	1	1906	60,840.00	59,338.60	1,501.40
Rent of building	do	33	869	1	1906	3,000.00	3,000.00	....
Grass and forage plant investigations	do	33	869	1	1906	37,160.00	33,279.00	3,881.00
Rent of building	do	33	869	1	1906	2,500.00	2,490.00	10.00
Experimental gardens and grounds	do	33	870	1	1906	15,320.00	15,273.75	46.25
Experimental gardens and grounds, 1905–6	do	33	870	1	1906	5,000.00	4,978.00	22.00
Arlington experimental farm	do	33	870	1	1906	20,000.00	19,667.35	332.65
Tea-culture investigations	do	33	870	1	1906	8,500.00	7,944.83	555.17
Purchase and distribution of valuable seeds	do	33	870	1	1906	205,140.00	202,767.39	2,372.61
Foreign seed and plant introduction	do	33	871	1	1906	37,780.00	32,429.83	5,350.17
Investigating production of domestic sugar	do	33	872	1	1906	7,500.00	7,317.54	182.46
Forest Service:								
General expenses, Forest Service	do	33	872	1	1906	768,180.00	767,722.04	457.96
Rent of buildings	do	33	873	1	1906	25,000.00	25,000.00	....
Bureau of Chemistry:								
Laboratory, including $3,000 for table sirup	do	33	873	1	1906	130,920.00	128,289.99	2,630.01
Bureau of Soils:								
Soil investigations, including $4,000 for rent of building	do	33	875	1	1906	170,000.00	167,403.73	2,596.27
Bureau of Entomology:								
Entomological investigations, including $2,500 for moth investigations	do	33	876	1	1906	68,060.00	65,457.52	2,602.48
Bureau of Biological Survey:								
Biological investigations	do	33	877	1	1906	44,420.00	44,064.71	355.29
Division of Publications:								
Publications, Department of Agriculture, Farmers' Bulletins	do	33	878	1	1906	98,750.00	98,601.49	148.51
Artists, etc	do	33	878	1	1906	3,500.00	3,434.10	65.90
Labor, etc	do	33	879	1	1906	30,000.00	29,767.04	232.96
Bureau of Statistics:								
Collecting agricultural statistics	do	33	879	1	1906	93,900.00	90,007.12	3,892.88
Foreign-market investigations	do	33	879	1	1906	4,900.00	4,720.13	179.87
Library, Department of Agriculture	do	33	880	1	1906	8,040.00	7,411.73	628.27

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Contingent expenses, Department of Agriculture	Mar. 3, 1905	33	880	1	1906	$35,000.00	$34,878.55	$121.45
Contingent expenses, 1905-6	do	33	880	1	1906	2,000.00	2,000.00	....
Agricultural experiment stations ($1,034,660[1])	do	33	881	1	1906	21,660.00	20,908.90	751.10
Stations of Alaska, including $3,000 for purchase of live stock	do	33	881	1	1906	18,000.00	18,000.00	....
Stations of Hawaii	do	33	881	1	1906	15,000.00	15,000.00	....
Stations of Porto Rico	do	33	881	1	1906	15,000.00	15,000.00	....
Farmers' institutes	do	33	882	1	1906	5,000.00	4,550.52	449.48
Nutrition investigations	do	33	882	1	1906	20,000.00	19,805.11	194.89
Irrigation investigations	do	33	882	1	1906	74,200.00	74,044.61	155.39
Public-road inquiries	do	33	882	1	1906	37,660.00	36,479.77	1,180.23
Cotton-boll weevil investigations	do	33	883	1	1906	190,000.00	154,671.59	35,328.41
Weather Bureau:								
Salaries	do	33	862	1	1906	191,430.00	190,930.72	499.28
Fuel, lights, and repairs	do	33	862	1	1906	10,000.00	9,926.33	73.67
Contingent expenses	do	33	863	1	1906	10,000.00	9,841.53	158.47
Salaries, station employees	do	33	863	1	1906	531,550.00	530,662.89	887.11
General expenses	do	33	863	1	1906	562,010.00	553,143.78	8,866.22
Buildings	do	33	863	1	1906	53,000.00	52,748.43	251.57
Cables and land lines	do	33	864	1	1906	35,000.00	34,121.31	878.69
Salaries, officers and clerks	June 30, 1906	34	670	1	1907	750,170.00	731,284.77	18,885.23
Salaries, extra labor	do	34	670	1	1907	7,600.00	6,430.73	1,169.27
Contingent expenses	do	34	692	1	1907	37,000.00	36,603.13	396.87
Library	do	34	691	1	1907	10,000.00	9,518.47	481.53
Bureau of Animal Industry:								
General expenses	do	34	673	1	1907	809,700.00	745,546.97	64,153.03
Rent of buildings	do	34	673	1	1907	2,500.00	2,481.00	19.00
Southern dairy work	do	34	674	1	1907	20,000.00	17,762.01	2,237.99
Diseases of domestic animals, Minnesota	do	34	674	1	1907	5,000.00	1,691.76	3,308.24
Animal breeding and feeding	do	34	674	1	1907	25,000.00	24,361.92	638.08
Meat inspection	do	34	674	1	1907	3,000,000.00	2,163,907.68	836,092.32
Eradicating cattle ticks:								
1907	do	34	696	1	1907	82,500.00	81,328.30	1,171.70
1907 and 1908	Mar. 4, 1907	34	1281	1	1907	25,000.00	14,188.10	10,811.90
Bureau of Plant Industry:								
General expenses	June 30, 1906	34	680	1	1907	480,406.28	470,158.84	8,801.16
Rent and repairs	do	34	681	1	1907	11,300.00	11,216.75	83.25
Ozark Mountain investigations	do	34	681	1	1907	3,553.72	4,993.44	6.56
Grain investigations	do	34	681	1	1907	15,000.00	14,903.23	96.77
Improving roads	do	34	681	1	1907	3,500.00	3,474.10	25.90
Purchase and distribution of valuable seeds	do	34	682	1	1907	205,140.00	201,004.98	4,135.02
Foreign seed and plant introduction	do	34	682	1	1907	35,781.21	33,834.64	1,946.57
Erection of building at Chico, Cal	do	34	683	1	1907	1,998.79	1,998.79	([2])
Cotton-boll weevil investigations:								
1907	do	34	695	1	1907	105,000.00	101,832.47	3,167.53
1907 and 1908	Mar. 4, 1907	34	1280	1	1907	40,000.00	39,999.63	.37
Bureau of Chemistry:								
Laboratory	June 30, 1906	34	685	1	1907	145,920.00	142,174.00	3,746.00
Enforcement of the food and drugs act	Dec. 19, 1906	34	841	1	1907	250,000.00	100,279.95	149,720.05
Bureau of Soils:								
Soils investigations	June 30, 1906	34	687	1	1907	181,000.00	179,910.62	1,089.38
Rent of buildings	do	34	687	1	1907	4,000.00	3,920.00	80.00
Bureau of Entomology:								
Entomological investigations	do	34	688	1	1907	70,000.00	69,114.27	885.73
White-fly investigations	do	34	688	1	1907	5,000.00	4,902.34	97.66
Cotton-boll weevil investigations	do	34	695	1	1907	85,000.00	64,873.54	20,126.46
Preventing spread of moths:								
1907	do	34	696	1	1907	82,500.00	81,993.24	506.76
1907 and 1908	Mar. 4, 1907	34	1281	1	1907	150,000.00	8,592.73	141,407.27

[1] Of this amount $960,000 was paid directly to the experiment stations from the Treasury Department.

[2] Exhausted.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Bureau of Biological Survey:								
Biological investigations	June 30, 1906	34	688	1	1907	$44,420.00	$43,975.22	$444.78
Division of Publications:								
Publications, Farmers' Bulletins	do	34	690	1	1907	98,750.00	98,601.18	148.82
Artists, etc	do	34	690	1	1907	3,500.00	3,387.46	112.54
Labor, etc	do	34	690	1	1907	30,000.00	29,836.21	163.79
Bureau of Statistics:								
Collecting agricultural statistics	do	34	691	1	1907	108,000.00	105,466.40	2,533.60
Foreign markets investigations	do	34	691	1	1907	4,900.00	4,852.95	47.05
Office of Experiment Stations:								
Agricultural experiment stations ($803,500 [1])	do	34	693	1	1907	25,500.00	697,210.54	48,289.46
Farmers' institutes	do	34	693	1	1907	5,000.00	4,765.85	234.15
Station at Alaska, including $3,000 for purchase of live stock	do	34	693	1	1907	18,000.00	17,987.49	12.51
Station at Hawaii, including $5,000 for water supply	do	34	693	1	1907	20,000.00	19,998.75	1.25
Station at Porto Rico	do	34	693	1	1907	15,000.00	15,000.00	(2)
Nutrition investigations	do	34	694	1	1907	20,000.00	19,990.99	9.01
Irrigation investigations	do	34	694	1	1907	122,200.00	121,638.29	561.71
Office of Public Roads: Public road inquiries	do	34	694	1	1907	57,660.00	56,833.94	826.06
Weather Bureau:								
Salaries	do	34	671	1	1907	194,690.00	193,918.11	771.89
Fuel, lights, and repairs	do	34	671	1	1907	10,000.00	9,928.49	71.51
Contingent expenses	do	34	671	1	1907	10,000.00	9,912.56	87.44
Salaries, station employees	do	34	672	1	1907	541,550.00	540,702.30	847.70
General expenses	do	34	672	1	1907	630,000.00	616,415.03	13,584.97
Buildings	do	34	672	1	1907	53,000.00	51,727.28	1,272.72
Forest Service:								
Salaries, officers and clerks	do	34	683	1	1907	112,860.00	112,133.16	726.84
General expenses	do	34	683	1	1907	849,640.00	849,265.94	374.06
Rent	do	34	685	1	1907	35,000.00	29,050.36	5,949.64
Building on Dismal River Forest Reserve	do	34	696	1	1907	2,500.00	2,475.22	24.78
Wichita Forest and Game Preserve	do	34	696	1	1907	15,000.00	14,999.00	1.00
Survey and report on Appalachian and White Mountain watersheds, 1907 and 1908	Mar. 4, 1907	34	1281	1	1907	25,000.00	857.14	24,142.86
Administration, etc., of the National Forests, 1907 and 1908	do	34	1270	1	1907	125,000.00	6,213.21	118,786.79
Special appropriations:								
Pomological investigations, fund from sale of fruits and vegetables	Apr. 23, 1904	33	382	1	1905	3,744.74	3,744.64	.10
Agricultural experiment stations, fund from sale of card indexes	do	33	293	1	1905	65.15	65.15	(2)
Buildings, Department of Agriculture	Mar. 3, 1903 Mar. 3, 1905	32 33	1139 1211	...	......	250,000.00 700,000.00	....	....
Balance available July 1, 1906	....	...	......	...	......	480,934.68	....	....
Sundry civil act	June 30, 1906	34	758	...	......	300,000.00	535,594.61	245,340.07
Administration, etc., forest reserves	....	...	......	...	......	925,000.00	812,293.34	112,706.66
Cooperative work, forest investigations	....	...	......	...	......	21,410.25	16,612.05	4,798.20
Salaries, officers and clerks	Mar. 4, 1907	34	1256	1	1908	969,090.00	947,454.88	21,635.12
Salaries, extra labor	do	34	1256	1	1908	7,600.00	7,592.28	7.72
Contingent expenses	do	34	1277	1	1908	47,000.00	46,435.97	564.03
Library	do	34	1277	1	1908	12,500.00	12,498.43	1.57

[1] This includes $720,000 for State experiment stations paid through the Treasury Department. Congress also appropriated $336,000 for State experiment stations under the Adams bill to be paid through the Treasury Department. Total paid through the Treasury Department for State experiment stations, $1,056,000. Congress also appropriated in the sundry civil bill for printing and binding $300,000.

[2] Exhausted.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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Bureau of Animal Industry:								
General expenses	Mar. 4, 1907	34	1259	1	1908	$892,200.00	$878,938.39	$13,261.61
Diseases of domestic animals, Minnesota	do	34	1259	1	1908	5,000.00	2,970.01	2,029.99
Animal breeding and feeding	do	34	1260	1	1908	50,000.00	49,649.15	350.85
Meat inspection	June 30, 1906	34	674	1	1908	3,000,000.00	2,725,034.27	274,965.73
Eradicating cattle ticks:								
1908	Mar. 4, 1907	34	1281	1	1908	125,000.00	122,444.15	2,555.85
1907 and 1908 (appropriated $25,000; balance July 1, 1907)	do	34	1281	1	1908	10,811.90	10,811.90	(1)
Bureau of Plant Industry:								
General expenses, 1908-9						10,000.00	9,992.61	7.39
General expenses	do	34	1266	1	1908	515,484.25	572,635.62	848.63
Rent and repairs	do	34	1267	1	1908	11,295.75	11,295.75	(1)
Grain investigations	do	34	1267	1	1908	40,000.00	39,862.20	137.80
Purchase and distribution of valuable seeds (includes $50,000, deficiency act)	do	34	1267	1	1908	252,000.00	249,864.82	2,135.18
Foreign seed and plant introduction	do	34	1267	1	1908	36,000.00	35,487.38	512.62
Cotton-boll weevil investigations, 1908	do	34	1280	1	1908	110,000.00	109,513.44	486.56
Bureau of Chemistry: Laboratory	do	34	1271	1	1908	650,000.00	611,925.10	38,074.90
Bureau of Soils:								
Soil investigations	do	34	1272	1	1908	166,000.00	165,589.19	410.81
Rent of buildings	do	34	1273	1	1908	4,000.00	3,486.66	513,34
Bureau of Entomology:								
Entomological investigations	do	34	1273	1	1908	103,800.00	101,416.46	2,383.54
White fly investigations	do	34	1274	1	1908	10,000.00	9,530.04	469.96
Cotton-boll weevil investigations	do	34	1280	1	1908	40,000.00	38,396.83	1,603.17
Preventing spread of moths, 1907 and 1908 (appropriated $150,000; balance July 1, 1907)	do	34	1280	1	1908	141,407.27	132,475.59	8,931.68
Bureau of Biological Survey:								
Biological investigations	do	34	1274	1	1908	44,420.00	44,261.67	158.33
Division of Publications: Publications [2]	do	34	1275	1	1908	35,000.00	34,888.63	111.37
Bureau of Statistics:								
Collecting agricultural statistics	do	34	1276	1	1908	118,000.00	117,917.44	82.56
Foreign markets investigations	do	34	1276	1	1908	4,900.00	4,705.02	194.98
Office of Experiment Stations:								
Agricultural experiment stations ($827,000 [3])	do	34	1278	1	1908	30,000.00	28,341.73	1,658.27
Farmers' institutes	do	34	1279	1	1908	5,000.00	4,931.47	68.53
Station at Alaska	do	34	1278	1	1908	24,000.00	23,995.29	4.71
Station at Hawaii	do	34	1278	1	1908	24,000.00	23,994.94	5.06
Station at Porto Rico	do	34	1278	1	1908	24,000.00	24,000.00	(1)
Nutrition investigations	do	34	1279	1	1908	5,000.00	1,758.98	3,241.02
Irrigation investigation	do	34	1279	1	1908	150,000.00	149,305.43	694.57
Office of Public Roads:								
Public road inquiries	do	34	1280	1	1908	55,660.00	55,592.98	67.02
Rent and repairs	do	34	1280	1	1908	2,000.00	1,879.93	120.07
Weather Bureau:								
Salaries	do	34	1257	1	1908	196,990.00	196,250.16	739.84
Fuel, lights, and repairs	do	34	1258	1	1908	10,000.00	9,884.15	115.85
Contingent expenses	do	34	1258	1	1908	10,000.00	9,815.34	184.66
Salaries, station employees	do	34	1258	1	1908	551,550.00	550,545.99	1,004.01
General expenses	do	34	1258	1	1908	645,000.00	593,211.46	51,788.54
Forest service:								
General expenses	do	34	1269	1	1908	1,696,800.00	1,702,007.47	1,578.17
Rent (joint resolution, Jan. 7, 1908, increasing rent)	do	34	1270	1	1908	60,000.00	53,214.36	

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[1] Exhausted.

[2] Congress also appropriated, in the sundry civil bill, for printing and binding $133,750.

[3] This includes $720,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department. Congress also appropriated $432,000 as a permanent appropriation for State experiment stations under the Adams bill, to be paid through the Treasury Department. Total to be paid through the Treasury Department for State experiment stations, $1,152,000.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Forest Service—Continued.								
Administration, etc., of National Forests, 1908	Mar. 4, 1907	34	1270	1	1908	$375,000.00	$374,034.44	$965.56
Survey and report on Appalachian and White Mountain watersheds, 1907 and 1908 (appropriated $25,000; balance July 1, 1907)	do	34	1281	1	1908	23,403.76	15,845.37	7,558.39
Administration, etc., of National Forests, 1907 and 1908 (appropriated $125,000; balance July 1, 1907)	do	34	1270	1	1908	118,786.79	118,786.29	.50
Special appropriations:.								
Buildings, Department of Agriculture ($1,500,000)—								
Balance available July 1, 1909	Mar. 3, 1903	32	1139	...	......	1,251.10	968.40	282.70
Paper tests	Mar. 3, 1905	33	1211	...	......	10,000.00	9,974.13	25.87
Salaries, officers and clerks	May 23, 1908	35	251	1	1909	879,660.00	856,891.19	22,768.81
Salaries, extra labor	do	35	251	1	1909	7,600.00	7,410.85	189.15
Contingent expenses	do	35	265	1	1909	86,200.00	85,851.79	348.21
Library	do	35	264	1	1909	15,500.00	15,484.39	15.61
Bureau of Animal Industry:								
General expenses	do Feb. 9, 1909 Mar. 4, 1909	35 35 35	254 616 927	1 1 1	1909	[1] 1,247,200.00	1,214,792.71	32,407.29
Animal breeding and feeding	May 23, 1908	35	255	1	1909	50,000.00	47,302.19	2,697.81
Meat inspection	June 30, 1906	34	674	1	1909	3,000,000.00	2,887,100.05	112,899.95
Eradicating cattle ticks—								
1909	May 23, 1908	35	268	1	1909	225,000.00	202,797.16	22,202.84
1908 and 1909	do	35	268	1	1909	25,000.00	25,000.00	(2)
Bureau of Plant Industry:								
General expenses, 1909	do	35	256	1	1909	886,266.00	873,605.23	12,660.77
Purchase and distribution of valuable seeds, $202,000	do	35	257	1	1909	258,000.00	201,378.40	621.60
Foreign seed and plant introduction, $56,000							55,377.46	622.54
Bureau of Chemistry: Laboratory	do Feb. 9, 1909	35 35	260 616	1 1	1909	[3] 860,000.00	826,830.62	33,169.38
Bureau of Soils: Soil investigations	May 23, 1908	35	261	1	1909	200,000.00	199,415.09	584.91
Bureau of Entomology:								
Entomological investigations—								
1909	do	35	262	1	1909	148,800.00	146,280.85	2,519.15
1908 and 1909	do	35	262	1	1909	10,000.00	9,857.82	142.18
Preventing spread of moths, 1908 and 1909	do	35	268	1	1909	250,000.00	234,440.06	15,559.94
Bureau of Biological Survey:								
Biological investigations	do	35	262	1	1909	54,420.00	53,968.58	451.42
Division of Publications: Publications, Department of Agriculture [4]	do	35	263	1	1909	40,000.00	39,915.72	84.28
Bureau of Statistics: Collecting agricultural statistics	do	35	264	1	1909	125,000.00	122,402.81	2,597.19
Office of Experiment Stations:								
Agricultural experiment stations ($1,371,000) [5]	do	35	265	1	1909	30,000.00	1,276,436.31	1,563.69
Farmers' institutes	do	35	266	1	1909	10,000.00	9,655.91	344.09
Station at Alaska	do	35	266	1	1909	26,000.00	25,998.70	1.30
Station at Hawaii	do	35	266	1	1909	26,000.00	25,990.19	9.81
Station at Port Rico	do	35	266	1	1909	26,000.00	26,000.00	....
Station at island of Guam	do	35	266	1	1909	5,000.00	4,971.45	28.55
Nutrition investigations	do	35	266	1	1909	7,000.00	6,995.03	4.97
Irrigation investigations	do	35	266	1	1909	150,000.00	149,588.32	411.68

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[1] Including $150,000, deficiency act, Feb. 9, 1909, and $150,000 by deficiency act, Mar. 4, 1909.

[2] Exhausted.

[3] Including $100,000, deficiency act, Feb. 9, 1909.

[4] Congress also appropriated in the sundry civil bill for printing and binding $460,000.

[5] This includes $720,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department. Congress also appropriated $528,000 as a permanent appropriation for State experiment stations under the Adams bill, to be paid through the Treasury Department. Total to be paid through the Treasury Department for State experiment stations, $1,248,000.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.				
Office of Public Roads:								
Public roads inquiries	May 23, 1908	35	267	1	1909	$73,000.00	$71,836.24	$1,163.76
Rent and repairs	do	35	267	1	1909	2,000.00	2,000.00	....
Weather Bureau:								
Salaries	do	35	252	1	1909	202,510.00	202,141.48	368.52
Fuel, lights, and repairs	do	35	252	1	1909	10,000.00	9,860.75	139.25
Contingent expenses	do	35	253	1	1909	11,000.00	10,721.27	278.73
Salaries, station employees	do	35	253	1	1909	586,750.00	586,265.12	484.88
General expenses	do	35	253	1	1909	852,000.00	831,764.20	20,235.80
Forest Service:								
General expenses	do	35	259	1	1909	3,151,900.00	3,134,455.63	17,444.37
Improvement of the National Forests	do	35	260	1	1909	600,000.00	598,688.72	1,311.28

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.[1]	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
FISCAL YEAR 1910.										
Salaries, Department of Agriculture (not including Weather Bureau)	Mar. 4, 1909	35	1039	2	1910			$1,126,560.00	$1,104,123.54	$22,436.46
Officers and clerks	do	35	1039	2	1910	$1,118,960			1,096,824.50	22,135.50
Extra labor	do	35	1040	2	1910	7,600			7,299.04	300.96
Contingent expenses, Department of Agriculture	do	35	1054	2	1910			80,000.00	79,369.61	630.39
Library, Department of Agriculture	do	35	1054	2	1910			16,500.00	16,492.31	7.69
Paper tests, 1910	do	35	1057	2	1910			10,000.00	9,998.32	1.68
Allotted to Bureau of Plant Industry						5,000	$439.25 F		439.25	
Allotted to Forest Service						5,000	9,560.75 F		9,559.07	1.68
Buildings, Department of Agriculture ($1,500,000), balance available July 1, 1909	Mar. 3, 1903 Mar. 4, 1907	32 34	1139 1364	1	1910			1,251.10	1,251.10	
Paper tests ($10,000), balance available July 1, 1909	Mar. 23, 1908	35	267	1	1910			2,527.48	2,527.48	
BUREAU OF ANIMAL INDUSTRY.										
General expenses, Bureau of Animal Industry	Mar. 4, 1909	35	1042	2	1910			1,263,760.00	1,179,385.77	84,374.23
Inspection and quarantine	do	35	1043	2	1910	625,000			598,365.96	26,634.04
Eradicating cattle ticks	do	35	1043	2	1910	250,000			243,886.17	6,113.83
Dairy industry	do	35	1043	2	1910	149,000			124,002.18	24,997.82
Animal husbandry	do	35	1043	2	1910	43,000			33,560.97	9,439.03
Diseases of animals	do	35	1043	2	1910	109,000			101,865.30	7,134.70
Purchase of land for experiment station	do	35	1043	2	1910	25,000			25,000.00	
Administration expenses	do	35	1043	2	1910	62,760			52,705.19	10,054.81
Cooperative experiments in animal feeding and breeding	May 23, 1908	35	255	1	1910			50,000.00	45,885.73	4,114.27
Meat inspection, Bureau of Animal Industry (permanent appropriation)	June 30, 1906	34	674	1	1910			3,000,000.00	2,936,177.86	63,822.14
BUREAU OF PLANT INDUSTRY.										
General expenses, Bureau of Plant Industry, 1909–10 (appropriated $50,000), balance available July 1, 1909	Mar. 4, 1909	35	1045	2	1910			32,633.53	32,524.10	109.43
General expenses, Bureau of Plant Industry, 1910	do	35	1044	2	1910			1,130,796.00	1,089,423.42	41,372.58
Pathological laboratory	do	35	1044	2	1910	22,470			22,258.11	211.89
Fruit diseases	do	35	1044	2	1910	34,700			33,403.64	1,296.36
Forest pathology	do	35	1044	2	1910	17,340	16,540.00 A		16,334.77	205.23
Cotton and truck diseases	do	35	1044	2	1910	13,060			12,885.55	174.45
Crop physiology	do	35	1044	2	1910	27,290	26,025.00 CM		25,832.06	192.94
Bacteriology and nutrition	do	35	1044	2	1910	25,070			22,453.35	2,616.65

Crop acclimatization	do	35	1045	2	1910	17,990			17,882.66	107.34
Drug and other plants	do	35	1045	2	1910	43,420	44,820.00 B		43,913.08	906.92
Crop technology	do	35	1045	2	1910	13,030			12,620.60	409.40
Cotton standardization	do	35	1045	2	1910	12,250			11,325.13	924.87
Grain standardization	do	35	1045	2	1910	52,440			51,785.53	654.47
Physical investigations	do	35	1045	2	1910	15,510			15,421.63	88.37
Special seeds and plants	do	35	1045	2	1910	11,550			11,135.58	414.42
Seed testing laboratories	do	35	1045	2	1910	25,840	26,040.00 Q		25,865.23	174.47
Grain investigations	do	35	1045	2	1910	63,910	64,830.00 AR		64,570.05	259.95
Tobacco investigations	do	35	1045	2	1910	23,180			20,297.82	2,882.18
Cotton breeding	do	35	1045	2	1910	18,130	16,730.00 B		16,556.76	173.24
General plant breeding	do	35	1045	2	1910	14,840			12,682.87	2,157.13
Paper plant investigations	do	35	1045	2	1910	10,000			9,510.93	489.07
Alkali and drought resistant plants	do	35	1045	2	1910	17,550			17,162.68	387.32
Sugar plant investigations	do	35	1045	2	1910	24,300			24,279.71	20.29
Taxonomic and range investigations	do	35	1045	2	1910	18,250			18,021.38	228.62
Farm management	do	35	1045	2	1910	133,000	132,270.00 PQ		118,347.23	13,922.77
Farmers' cooperative demonstration work	do	35	1045	2	1910	175,000			171,114.72	3,885.28
Dry-land agriculture	do	35	1045	2	1910	31,760			29,347.75	2,412.25
Western agricultural extension	do	35	1045	2	1910	76,680			75,432.12	1,247.88
Pomological investigations	do	35	1046	2	1910	71,360	72,625.00 CM		69,626.06	2,998.94
Experimental gardens and grounds	do	35	1046	2	1910	19,230	21,153.00 DU		21,091.54	61.46
Arlington farm and horticulture	do	35	1046	2	1910	38,470	37,200.00 DP		37,097.84	102.16
Florida subtropical garden	do	35	1046	2	1910	5,100			5,050.18	49.82
South Texas garden	do	35	1046	2	1910	9,100			9,071.67	28.33
Administrative and miscellaneous	do	35	1046	2	1910	48,976	48,733.00 RU		47,044.89	1,688.11
Purchase and distribution of valuable seeds	do	35	1047	2	1910			317,960.00	315,302.63	2,657.37
Congressional seed distribution	do	35	1047	2	1910	262,320			260,385.78	1,934.22
Forage crop investigations	do	35	1047	2	1910	10,000			9,556.08	443.92
Foreign seed and plant introduction	do	35	1047	2	1910	45,640			45,360.77	279.23
BUREAU OF CHEMISTRY.										
General expenses, Bureau of Chemistry (deficiency act, Feb. 25, 1910, $50,000)	Mar. 4, 1909	35	1049	2	1910			855,000.00	792,772.71	62,227.29
Laboratory, miscellaneous expenses	do	35	1049	2	1910	30,000			29,105.25	894.75
Laboratory, transportation	do	35	1049	2	1910	6,300			4,114.10	2,185.90
Laboratory, salaries and rent	do	35	1049	2	1910	76,240			66,975.04	9,264.96
Laboratory, American food products	do	35	1049	2	1910	5,000			4,968.75	31.25
Food and drugs act, salaries in Washington	do	35	1049	2	1910	200,000	185,000.00 G		169,700.43	15,299.57
Food and drugs act, salaries out of Washington ($266,460)	do	35	1049	2	1910	226,460	GN		221,692.31	4,767.69
Food and drugs act, miscellaneous expenses ($136,000)	do	35	1049	2	1910	120,000			116,414.67	3,585.33
Deficiency act, miscellaneous expenses						27,000			19,543.27	7,456.73
Food and drugs act, transportation ($85,000)	Mar. 4, 1909	35	1049	2	1910	81,000			67,611.42	13,388.58
Deficiency act, witness fees						23,000			21,565.97	1,434.03

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[1] And not to exceed 10 per cent of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided for shall be available interchangeably for expenditure on the objects included within the general expenses of such bureau, division, or office, but no more than 10 per cent shall be added to any one item of appropriation except in cases of extraordinary emergency, and then only upon the written order of the Secretary of Agriculture.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
BUREAU OF CHEMISTRY—continued.										
General expenses, Bureau of Chemistry—Con.										
Allotted to referee board:										
Food and drugs act, salaries out of Washington	Mar. 4, 1909	35	1049	2	1910	$40,000	$54,000.00 VV		$53,155.81	$844.19
Food and drugs act, miscellaneous expenses	do	35	1049	2	1910	16,000	17,000.00 V		16,126.68	873.32
Food and drugs act, transportation	do	35	1049	2	1910	4,000			1,799.01	2,200.99
BUREAU OF SOILS.										
General expenses, Bureau of Soils	Mar. 4, 1909	35	1050	2	1910			$197,360.00	196,482.95	877.05
Soil laboratory investigations	do	35	1050	2	1910	48,000	48,500.00 J		48,380.39	119.61
Soil water investigations	do	35	1050	2	1910	5,000	4,500.00 J		4,302.58	197.42
Soil survey	do	35	1050	2	1910	137,360			136,852.32	507.68
Administrative expenses	do	35	1050	2	1910	7,000			6,947.66	52.34
BUREAU OF ENTOMOLOGY.										
General expenses, Bureau of Entomology	do	35	1050	2	1910			198,400.00	188,765.42	9,634.58
Deciduous fruit insects	do	35	1050	2	1910	46,600	43,600.00 E		40,114.53	3,485.47
Cereal and forage insects	do	35	1050	2	1910	21,000	22,500.00 E		22,093.38	406.62
Southern field crop insects	do	35	1050	2	1910	42,000			40,807.00	1,193.00
Forest insects	do	35	1050	2	1910	12,000	13,500.00 E		13,400.64	99.36
Truck crop and stored product insects	do	35	1050	2	1910	16,250			15,913.49	336.51
Bee culture	do	35	1050	2	1910	10,000			9,858.85	141.15
Citrus fruit insects	do	35	1051	2	1910	16,500			15,315.75	1,184.25
Miscellaneous insects	do	35	1051	2	1910	34,050			31,261.78	2,788.22
Preventing spread of moths, Bureau of Entomology	do	35	1051	2	1910			300,000.00	268,194.44	31,805.56
BUREAU OF BIOLOGICAL SURVEY.										
General expenses, Bureau of Biological Survey	do	35	1051	2	1910			74,420.00	70,629.84	3,790.16
Game preservation	do	35	1051	2	1910	9,420			8,315.92	1,104.08
Maintenance of mammal and bird reservations	do	35	1051	2	1910	7,000			6,311.15	688.85
Food habits of birds and mammals	do	35	1051	2	1910	25,000			23,717.67	1,282.33
Biological investigations	do	35	1051	2	1910	18,000			17,420.50	579.50
Administrative expenses	do	35	1052	2	1910	15,000			14,864.60	135.40

DIVISION OF PUBLICATIONS.										
General expenses, Division of Publications [1]	do	35	1053	2	1910		12,511.48 WT	33,000.00	32,369.78	630.22
Rent in Washington	do	35	1053	2	1910	5,000			5,000.00	
Labor-saving machinery, etc	do	35	1053	2	1910	5,000			4,971.10	28.90
Stationery and materials	do	35	1053	2	1910	11,500			12,511.48	
Furniture and fixtures	do	35	1053	2	1910	1,000			977.54	22.46
Photographic equipment	do	35	1053	2	1910	5,000			4,959.96	40.04
Gas, electricity, etc	do	35	1053	2	1910	1,500	1,488.52 T		1,223.09	265.43
Wagons, horses, etc	do	35	1053	2	1910	1,000	1,075.00 S		998.53	76.47
Miscellaneous expenses	do	35	1053	2	1910	3,000	1,925.00 WS		1,728.08	196.92
BUREAU OF STATISTICS.										
General expenses, Bureau of Statistics	do	35	1053	2	1910			117,060.00	111,331.47	5,728.53
Administrative expenses	do	35	1054	2	1910	25,860	23,360.00 K		22,609.08	750.92
Special field agents	do	35	1054	2	1910	56,000			53,452.63	2,547.37
State statistical agents	do	35	1054	2	1910	30,200	32,700.00 K		30,640.49	2,059.51
Special investigations	do	35	1054	2	1910	2,500			2,170.82	329.18
Cost production farm products	do	35	1054	2	1910	2,500			2,458.45	41.55
OFFICE OF EXPERIMENT STATIONS.										
Agricultural experiment stations ($863,800 [2])	do	35	1055	2	1910			143,800.00	140,248.13	3,551.87
Agricultural experiment stations	do	35	1055	2	1910	34,800			34,060.88	739.12
Farmers' institutes	do	35	1055	2	1910	10,000			9,814.67	185.33
Stations in Alaska	do	35	1055	2	1910	28,000			27,576.44	423.56
Station in Hawaii	do	35	1055	2	1910	28,000			27,994.03	5.97
Station in Porto Rico	do	35	1055	2	1910	28,000			27,987.19	12.81
Station on Island of Guam	do	35	1055	2	1910	15,000			14,991.25	8.75
Nutrition investigations	do	35	1056	2	1910			10,000.00	9,873.58	126.42
Irrigation investigations	do	35	1056	2	1910			75,000.00	73,348.00	1,652.00
Drainage investigations	do	35	1056	2	1910			81,160.00	76,682.94	4,477.06
OFFICE OF PUBLIC ROADS.										
General expenses, Office of Public Roads	do	35	1056	2	1910			100,000.00	99,266.42	733.58
Road management	do	35	1056	2	1910	18,000			17,972.20	27.80
Investigating road building and maintenance	do	35	1056	2	1910	34,000			33,871.27	128.73
Road material	do	35	1057	2	1910	25.000			24,637.85	362.15
Reports of investigations	do	35	1057	2	1910	23,000			22,785.10	214.90
Total for main department exclusive of Weather Bureau and Forest Service								9,217,188.11	8,872,427.55	344,760.56

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[1] Congress also appropriated in the sundry civil bill for printing and binding, $460,000.

[2] This includes $720,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department. Congress also appropriated $624,000 as a permanent appropriation for State experiment stations under the Adams bill, to be paid through the Treasury Department. Total to be paid through the Treasury Department for State experiment stations, $1,344,000.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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WEATHER BUREAU.										
Salaries, Weather Bureau	Mar. 4, 1909	35	1040	2	1910			$205,310.00	$204,633.91	$676.09
Contingent expenses, Weather Bureau	do	35	1041	2	1910			25,000.00	24,813.74	186.26
General expenses, Weather Bureau	do	35	1041	2	1910			1,277,950.00	1,261,047.80	16,902.20
Station salaries	do	35	1041	2	1910	$620,750			617,096.31	3,653.69
Miscellaneous expenses	do	35	1041	2	1910	91,000	$91,500.00 O		90,212.49	1,287.51
Instruments, etc	do	35	1041	2	1910	30,000	31,900.00 LO		31,413.28	486.72
Rents and repairs	do	35	1041	2	1910	80,000	83,500.00 IL		83,353.18	146.82
Traveling expenses	do	35	1041	2	1910	22,000	20,000.00 L		19,211.96	788.04
Telephoning and telegraphing	do	35	1041	2	1910	260,000	269,000.00 HI		261,789.21	7,210.79
Line and cable repairs	do	35	1041	2	1910	4,200	3,800.00 H		3,488.59	311.41
Investigations and substations	do	35	1041	2	1910	125,000	112,500.00 IO		109,632.36	2,867.64
Printing office	do	35	1041	2	1910	45,000			44,850.42	149.58
Total for Weather Bureau								1,508,260.00	1,490,495.45	17,764.55
FOREST SERVICE.										
General expenses, Forest Service	Mar. 4, 1909	35	1047	2	1910			3,986,000.00	3,940,485.02	45,514.98
Improvement of the national forests	do	35	1048	2	1910			600,000.00	597,211.82	2,788.18
National bison range (appropriated, $43,000), balance available July 1, 1909 (deficiency act Feb. 25, 1910, $7,700)	May 23, 1908 Mar. 4, 1909	35 35	267 927	1 1	1909 1909			50,480.40 42,780.40	50,480.40	
Naval stores industry ($10,000), balance available July 1, 1909	May 23, 1908	35	267	1	1909			1,050.68	1,050.68	
Total for (regular) Forest Service								4,637,531.08	4,589,227.92	48,303.16
Total of all regular and special appropriations for entire department								15,362,979.19	14,952,150.92	410,828.27
Payment to States and Territories, national forest funds								506,194.83	506,194.83	
Refunds to depositors, excess of deposits								48,966.86	48,966.86	
Cooperative work, forest investigations								40,670.39	40,670.39	
Grand total								15,958,811.27	15,547,983.00	410,828.27

FISCAL YEAR 1911.										
Salaries, Forest Service (included in main caption)	May 26, 1910	36	424	1	1911			60,200.00	56,599.49	3,600.51
Improvement of the national forests	do	36	431	1	1911			275,000.00	243,225.06	31,774.94
General expenses, Forest Service	do	36	424–430	1	1911			5,572,900.00	5,027,705.50	545,194.50
Fighting forest fires	do	36	430	1	1911	135,000	1,093,050.00		1,065,081.70	27,968.30
Maintenance and supplies	do	36	430	1	1911	221,040	234,041.47		162,808.00	71,233.47
Forest products	do	36	430	1	1911	129,420	129,620.00		118,685.89	10,934.11
National forest range investigations	do	36	430	1	1911	11,820	11,820.00		9,063.28	2,756.72
Silviculture, national forests	do	36	430	1	1911	66,640	60,275.68		56,313.74	3,961.94
Management of forests	do	36	430	1	1911	108,010	93,750.90		82,417.82	11,333.08
Market and miscellaneous investigations	do	36	430	1	1911	115,470	104,804.85		94,428.30	10,376.55
Paper tests	do	36	430	1	1911	14,000	14,000.00		11,091.80	2,908.20
Absaroka National Forest	do	36	425	1	1911	20,844	18,278.35		16,564.02	1,714.33
Alamo National Forest	do	36	425	1	1911	33,449	20,776.60		19,214.29	1,562.31
Angeles National Forest	do	36	425	1	1911	50,644	55,708.00		50,145.66	5,562.34
Apache National Forest	do	36	425	1	1911	31,414	31,244.98		28,080.07	3,164.91
Arapahoe National Forest	do	36	425	1	1911	21,560	19,865.00		18,143.88	1,721.12
Arkansas National Forest	do	36	425	1	1911	32,960	31,755.52		30,658.78	1,096.74
Ashley National Forest	do	36	425	1	1911	19.66[illegible]	13,581.64		11,881.61	1,700.03
Battlement National Forest	do	36	425	1	1911	15,700	15,314.00		13,961.10	1,352.90
Beartooth National Forest	do	36	425	1	1911	17,299	17,726.35		16,366.35	1,360.00
Beaverhead National Forest	do	36	425	1	1911	31,837	21,314.44		18,913.01	2,401.43
Bighorn National Forest	do	36	425	1	1911	32,238	28,087.13		24,861.32	3,225.81
Bitterroot National Forest	do	36	425	1	1911	31,391	29,447.04		26,936.06	2,510.98
Blackfeet National Forest	do	36	425	1	1911	38,159	20,335.86		18,001.46	2,334.40
Black Hills National Forest	do	36	425	1	1911	44,746	50,504.16		4,424.65	6,079.51
Boise National Forest	do	36	425	1	1911	27,925	24,269.12		21,627.45	2,641.67
Bonneville National Forest	do	36	425	1	1911	22,822	22,789.56		20,349.61	2,439.95
Cabinet National Forest	do	36	425	1	1911	21,143	16,642.60		15,312.05	1,330.55
Cache National Forest	do	36	425	1	1911	18,700	17,590.85		15,403.00	2,187.85
California National Forest	do	36	425	1	1911	26,240	26,316.22		21,723.99	4,592.23
Caribou National Forest	do	36	425	1	1911	20,200	15,567.10		13,502.84	2,064.26
Carson National Forest	do	36	426	1	1911	28,971	22,127.91		18,556.86	3,571.05
Cascade National Forest	do	36	426	1	1911	37,280	26,437.66		23,500.47	2,937.19
Challis National Forest	do	36	426	1	1911	21,600	13,311.00		11,491.90	1,819.10
Chelan National Forest	do	36	426	1	1911	42,195	40,173.05		35,368.78	4,804.27
Chiricahua National Forest	do	36	426	1	1911	21,131	15,541.00		13,277.56	2,263.44
Choctawhatchee National Forest	do	36	426	1	1911	9,009	9,909.00		8,871.71	1,037.29
Chugach National Forest	do	36	426	1	1911	17,848	18,048.00		15,393.35	2,654.65
Clearwater National Forest	do	36	426	1	1911	41,105	35,202.28		32,770.69	2,431.59
Cleveland National Forest	do	36	426	1	1911	38,783	38,483.00		30,824.63	7,658.37
Cochetopa National Forest	do	36	426	1	1911	17,704	16,146.13		14,674.66	1,471.47
Coconino National Forest	do	36	426	1	1911	50,226	41,358.77		37,240.10	4,118.67
Coeur d'Alene National Forest	do	36	426	1	1911	45,976	46,511.02		43,734.88	2,776.14
Colorado National Forest	do	36	426	1	1911	19,854	21,046.00		18,969.00	2,077.00
Columbia National Forest	do	36	426	1	1911	23,376	22,875.20		20,853.57	2,021.63
Colville National Forest	do	36	426	1	1911	22,910	22,679.50		20,218.00	2,461.50
Coronado National Forest	do	36	426	1	1911	24,212	14,121.45		12,998.56	1,122.89
Crater National Forest	do	36	426	1	1911	31,369	35,505.90		32,383.41	3,122.49
Crook National Forest	do	36	426	1	1911	27,712	20,034.00		18,689.74	1,344.26
Custer National Forest	do	36	426	1	1911	12,847	14,032.48		12,258.63	1,773.85

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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FOREST SERVICE—continued.										
General expenses, Forest Service—Continued.										
Datil National Forest	May 26, 1910	36	426	1	1911	$42,903	$33,720.77		$29,571.57	$4,149.20
Deerlodge National Forest	do	36	426	1	1911	41,208	41,519.62		36,564.42	4,955.20
Deschutes National Forest	do	36	426	1	1911	30,463	31,270.15		27,399.21	3,870.94
Dixie National Forest	do	36	426	1	1911	16,600	13,501.00		12,569.97	931.03
Eldorado National Forest	do	36	426	1	1911	11,350	12,485.00		10,924.19	1,560.81
Fillmore National Forest	do	36	426	1	1911	18,730	16,310.00		14,449.39	1,860.61
Fishlake National Forest	do	36	426	1	1911	20,800	14,849.15		13,678.38	1,170.77
Flathead National Forest	do	36	426	1	1911	35,830	37,825.68		36,181.72	1,643.96
Fremont National Forest	do	36	426	1	1911	29,900	25,181.55		22,990.07	2,191.48
Gallatin National Forest	do	36	426	1	1911	26,594	18,520.27		16,638.81	1,881.46
Garces National Forest	do	36	426	1	1911	19,345	11,393.83		9,785.70	1,608.13
Gila National Forest	do	36	427	1	1911	47,484	45,947.09		40,298.13	5,648.96
Gunnison National Forest	do	36	427	1	1911	20,586	18,523.64		16,684.49	1,839.15
Hayden National Forest	do	36	427	1	1911	16,850	15,004.03		13,546.85	1,457.18
Helena National Forest	do	36	427	1	1911	34,508	33,422.46		28,933.66	4,488.80
Holy Cross National Forest	do	36	427	1	1911	18,610	17,115.84		15,527.25	1,588.59
Humboldt National Forest	do	36	427	1	1911	19,026	20,276.00		17,931.75	2,344.25
Idaho National Forest	do	36	427	1	1911	21,780	15,116.65		13,370.55	1,746.10
Inyo National Forest	do	36	427	1	1911	29,500	22,540.00		19,752.79	2,787.21
Jefferson National Forest	do	36	427	1	1911	34,001	27,290.98		25,216.53	2,074.45
Jemez National Forest	do	36	427	1	1911	31,476	20,186.98		17,905.32	2,281.66
Kaibab National Forest	do	36	427	1	1911	20,400	16,641.78		15,365.43	1,276.35
Kaniksu National Forest	do	36	427	1	1911	28,448	31,204.50		27,923.70	3,280.80
Kansas National Forest	do	36	427	1	1911	8,805	7,432.00		6,305.52	1,126.48
Kern National Forest	do	36	427	1	1911	27,512	26,631.13		23,844.39	2,786.74
Klamath National Forest	do	36	427	1	1911	42,000	31,272.18		27,310.79	3,961.39
Kootenai National Forest	do	36	427	1	1911	30,634	32,080.80		28,837.83	3,242.97
La Sal National Forest	do	36	427	1	1911	13,890	12,934.81		11,413.56	1,521.25
Lassen National Forest	do	36	427	1	1911	31,154	22,322.00		19,024.08	3,297.92
Leadville National Forest	do	36	427	1	1911	29,720	22,384.00		20,314.43	2,069.57
Lemhi National Forest	do	36	427	1	1911	20,750	17,096.27		14,534.32	2,561.95
Lewis and Clark National Forest	do	36	427	1	1911	17,426	15,498.08		14,500.79	997.29
Lincoln National Forest	do	36	427	1	1911	20,218	13,915.00		12,513.51	1,401.49
Lolo National Forest	do	36	427	1	1911	28,952	31,502.54		28,399.60	3,102.94
Madison National Forest	do	36	427	1	1911	24,745	22,827.00		20,683.79	2,143.21
Malheur National Forest	do	36	427	1	1911	24,063	18,547.80		16,488.08	2,059.72
Manti National Forest	do	36	427	1	1911	23,000	20,581.33		18,759.39	1,821.94
Manzano National Forest	do	36	427	1	1911	14,776	10,680.60		9,570.37	1,110.23
Marquette National Forest	do	36	427	1	1911	2,405	1,945.28		1,268.44	676.84

Medicine Bow National Forest	do	36	427	1	1911	28,350	23,709.31	....	21,474.02	2,235.29
Michigan National Forest	do	36	427	1	1911	3,744	3,825.00	....	3,220.83	604.17
Minnesota National Forest	do	36	427	1	1911	24,433	19,521.70	....	17,896.40	1,625.30
Minidoka National Forest	do	36	428	1	1911	17,800	13,908.00	....	11,999.94	1,908.06
Missoula National Forest	do	36	428	1	1911	34,504	24,599.39	....	21,999.27	2,600.12
Moapa National Forest	do	36	428	1	1911	3,400	2,886.25	....	2,456.13	430.12
Modoc National Forest	do	36	428	1	1911	30,890	22,155.40	....	19,888.16	2,267.24
Mono National Forest	do	36	428	1	1911	23,725	20,778.19	....	16,738.81	4,039.38
Monterey National Forest	do	36	428	1	1911	15,070	8,370.00	....	6,393.22	1,976.78
Montezuma National Forest	do	36	428	1	1911	23,440	19,365.42	....	17,813.03	1,552.39
Nebo National Forest	do	36	428	1	1911	9,300	8,360.15	....	7,602.70	757.45
Nebraska National Forest	do	36	428	1	1911	18,250	13,987.50	....	12,954.44	1,033.06
Nevada National Forest	do	36	428	1	1911	20,900	18,195.00	....	16,129.69	2,065.31
Nezperce National Forest	do	36	428	1	1911	28,507	22,032.00	....	20,217.65	1,814.35
Ocala National Forest	do	36	428	1	1911	5,623	5,823.00	....	4,652.00	1,171.00
Olympic National Forest	do	36	428	1	1911	32,925	32,658.12	....	30,157.59	2,500.53
Oregon National Forest	do	36	428	1	1911	40,882	36,889.42	....	31,474.88	5,414.54
Ozark National Forest	do	36	428	1	1911	26,961	26,825.06	....	24,990.53	1,834.53
Palisade National Forest	do	36	428	1	1911	15,550	16,705.00	....	14,587.12	2,117.88
Payette National Forest	do	36	428	1	1911	20,660	20,722.00	....	18,433.68	2,288.32
Pecos National Forest	do	36	428	1	1911	29,489	29,937.90	....	27,367.35	2,570.55
Pend Oreille National Forest	do	36	428	1	1911	27,162	28,155.60	....	26,784.63	1,370.97
Pike National Forest	do	36	428	1	1911	41,280	41,399.83	....	38,234.75	3,165.08
Plumas National Forest	do	36	428	1	1911	42,012	38,307.00	....	32,967.52	5,339.48
Pocatello National Forest	do	36	428	1	1911	20,246	15,582.95	....	14,544.70	1,038.25
Powell National Forest	do	36	428	1	1911	16,500	11,630.00	....	10,150.96	1,479.04
Prescott National Forest	do	36	428	1	1911	33,851	22,983.23	....	21,311.45	1,671.78
Rainier National Forest	do	36	428	1	1911	36,220	24,462.44	....	22,079.05	2,383.39
Rio Grande National Forest	do	36	428	1	1911	26,620	27,190.61	....	25,257.54	1,933.07
Routt National Forest	do	36	428	1	1911	22,050	22,299.45	....	20,967.73	1,331.72
Salmon National Forest	do	36	428	1	1911	29,825	31,090.67	....	28,581.16	2,509.51
San Isabel National Forest	do	36	428	1	1911	18,070	17,034.89	....	15,284.61	1,750.28
San Juan National Forest	do	36	428	1	1911	31,458	28,693.34	....	25,837.06	2,856.28
Santa Barbara National Forest	do	36	428	1	1911	37,889	41,677.00	....	34,471.95	7,205.05
Sawtooth National Forest	do	36	429	1	1911	27,200	17,423.43	....	15,665.35	1,758.08
Sequoia National Forest	do	36	429	1	1911	31,512	25,412.00	....	20,011.10	5,400.90
Sevier National Forest	do	36	429	1	1911	20,550	17,476.06	....	15,804.97	1,671.09
Shasta National Forest	do	36	429	1	1911	38,675	39,952.22	....	33,844.56	6,107.66
Shoshone National Forest	do	36	429	1	1911	25,220	18,647.98	....	16,563.53	2,084.45
Sierra National Forest	do	36	429	1	1911	49,370	44,165.03	....	37,697.13	6,467.90
Sioux National Forest	do	36	429	1	1911	10,919	11,818.68	....	10,271.43	1,547.25
Siskiyou National Forest	do	36	429	1	1911	29,561	21,107.41	....	18,939.95	2,167.46
Sitgreaves National Forest	do	36	429	1	1911	28,074	22,770.00	....	19,407.02	3,362.98
Siuslaw National Forest	do	36	429	1	1911	23,175	19,481.80	....	18,002.57	1,479.23
Snoqualmie National Forest	do	36	429	1	1911	30,129	28,851.24	....	25,462.24	3,389.00
Sopris National Forest	do	36	429	1	1911	22,058	18,327.82	....	16,783.28	1,544.54
Stanislaus National Forest	do	36	429	1	1911	35,788	34,012.81	....	30,406.28	3,606.53
Sundance National Forest	do	36	429	1	1911	6,029	5,790.00	....	5,110.96	679.04
Superior National Forest	do	36	429	1	1911	19,379	15,276.00	....	12,979.52	2,296.48
Tahoe National Forest	do	36	429	1	1911	30,886	32,972.22	....	29,391.21	3,581.01
Targhee National Forest	do	36	429	1	1911	16,850	20,220.00	....	18,556.31	1,663.69
Teton National Forest	do	36	429	1	1911	22,100	11,570.67	....	10,201.63	1,369.04
Toiyabe National Forest	do	36	429	1	1911	24,000	13,960.00	....	12,607.03	1,352.97

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
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FOREST SERVICE—continued.										
General expenses, Forest Service—Continued.										
Tongass National Forest	May 26, 1910	36	429	1	1911	$8,300	$9,530.00		$8,347.54	$1,182.46
Tonto National Forest	do	36	429	1	1911	33,111	18,200.00		16,550.49	1,649.51
Trinity National Forest	do	36	429	1	1911	36,000	31,393.60		25,864.10	5,529.50
Tusayan National Forest	do	36	429	1	1911	27,214	26,939.60		23,826.43	3,113.17
Uinta National Forest	do	36	429	1	1911	28,600	23,657.93		21,372.24	2,285.69
Umatilla National Forest	do	36	429	1	1911	17,200	15,574.38		12,974.04	2,600.34
Umpqua National Forest	do	36	429	1	1911	36,110	31,057.41		26,194.78	4,862.63
Umcompahgre National Forest	do	36	429	1	1911	25,990	20,861.67		19,218.30	1,643.37
Wallowa National Forest	do	36	429	1	1911	33,300	26,033.49		23,189.75	2,843.74
Wasatch National Forest	do	36	429	1	1911	23,450	15,866.69		14,197.90	1,668.79
Washington National Forest	do	36	429	1	1911	31,925	22,866.99		19,951.13	2,915.86
Weiser National Forest	do	36	429	1	1911	22,800	18,818.00		16,632.58	2,185.42
Wenaha National Forest	do	36	430	1	1911	19,790	16,055.00		13,133.30	2,921.70
Wenatchee National Forest	do	36	430	1	1911	32,129	22,853.04		20,811.73	2,041.31
White River National Forest	do	36	430	1	1911	19,990	20,280.69		18,836.53	1,444.16
Whitman National Forest	do	36	430	1	1911	26,950	25,478.45		22,673.64	2,804.81
Wichita National Forest	do	36	430	1	1911	10,650	5,850.00		5,100.96	749.04
Wyoming National Forest	do	36	430	1	1911	19,700	17,566.00		15,196.79	2,369.21
Zuni National Forest	do	36	430	1	1911	19,741	11,240.71		9,696.64	1,544.07
General administration, 10 per cent	do	36	431	1	1911			$472,261.60	436,413.46	35,848.14
SPECIAL APPROPRIATIONS.										
Paper tests, 1911 (sundry civil bill, June 25, 1910)	June 25, 1910	36	753	1	1911			30,000.00	26,485.40	3,514.61
Refunds to depositors, excess of deposits								65,630.78	57,912.73	7,718.05
Cooperative work, forest investigations								14,915.59	10,937.88	3,977.71
National Bison Range	May 23, 1908 Mar. 4, 1909	35 35	267 927	1 1				3,089.18	2,381.61	707.57
Naval stores industry	May 23, 1908	35	267	1				4.55	4.55	
General expenses, Forest Service, 1911-12	Mar. 4, 1911	36	1252	1				70,000.00		70,000.00
Total for Forest Service								6,091,740.10	5,425,372.67	666,367.43
Salaries, Department of Agriculture (not including Weather Bureau)	May 26, 1910	36	416	1	1911			1,267,500.00	1,193,069.54	74,430.46
Officers and clerks	do	36	416, 417	1	1911	1,259,900			1,186,090.73	73,809.27
Extra labor	do	36	417	1	1911	7,600			6,978.81	621.19
Contingent expenses, Department of Agriculture	do	36	437	1	1911			100,000.00	85,792.44	14,207.56

Library, Department of Agriculture	do	36	437	1	1911			15,400.00	10,904.86	4,495.14
Enforcement of the insecticide act	Mar. 4,1911	36	1312	1	1911			35,000.00	6,237.48	28,762.52
National Forest Reservation Commission	Mar. 1,1911	36	963	14	1911			25,000.00	4.00	24,996.00
Acquisition of lands for protection of watersheds of navigable streams (appropriated, $2,000,000; but $25,000 in use at time of statement)	do	36	961	3	1911			25,000.00	9,964.17	15,035.83
Cooperative fire protection of forested watersheds of navigable streams	do	36	961	2				200,000.00		200,000.00
BUREAU OF ANIMAL INDUSTRY.										
General expenses, Bureau of Animal Industry	May 26,1910	36	419, 420	1	1911			1,234,540.00	1,043,876.50	190,663.50
Inspection and quarantine	do	36	420	1	1911	623,000	615,800.00 J		527,028.39	88,771.61
Eradicating cattle ticks	do	36	420	1	1911	250,000	243,800.00 WJ[I] L[I]		201,511.10	42,288.90
Dairy industry	do	36	420	1	1911	147,600	154,600.00 JL[I]		132,691.03	21,908.97
Animal husbandry	do	36	420	1	1911	42,000	46,200.00 JW		38,510.78	7,689.22
Diseases of animals	do	36	420	1	1911	108,000			92,732.17	15,267.83
Experimental farm	do	36	420	1	1911	12,000	13,200.00 J		3,346.88	9,853.12
Administrative expenses	do	36	420	1	1911	51,940	52,940.00 J[I]		48,056.15	4,883.85
Cooperative experiments in animal feeding and breeding	do	36	420	1	1911			50,000.00	45,946.39	4,053.61
Meat inspection, Bureau of Animal Industry (permanent appropriation)	June 30,1906	34	674	1	1911			3,000,000.00	2,601,418.96	398,581.04
General expenses, Bureau of Animal Industry, 1911-12	Mar. 4,1911	36	1240	1				65,000.00	10.85	64,989.15
BUREAU OF PLANT INDUSTRY.										
General expenses, Bureau of Plant Industry, 1910-11	May 26,1910	36	422	1				10,000.00	8,800.72	1,199.28
General expenses, Bureau of Plant Industry, 1911	do	36	421-423	1	1911			1,183,346.00	1,013,756.77	169,589.23
Pathological laboratory	do	36	421	1	1911	21,710	21,010.00 DEY		19,669.46	1,340.54
Fruit diseases	do	36	421	1	1911	34,075	33,675.00 R		28,936.27	4,738.73
Forest pathology	do	36	421	1	1911	16,510	16,310.00 E		14,886.74	1,423.26
Cotton and truck diseases	do	36	421	1	1911	12,960	13,360.00 R		11,289.91	2,070.09
Crop physiology	do	36	421	1	1911	25,015			23,018.43	1,996.57
Bacteriology and nutrition	do	36	421	1	1911	23,725			20,634.21	3,090.79
Crop acclimatization	do	36	421	1	1911	34,670			30,859.82	3,810.18
Drug and other plants	do	36	421	1	1911	42,970	42,870 EY		38,995.48	3,874.52
Crop technology	do	36	422	1	1911	13,030	14,330.00 NTZAI		11,871.80	2,458.20
Cotton standardization	do	36	422	1	1911	36,650	34,600.00 KSTZAIKI		24,477.52	10,122.48
Grain standardization	do	36	422	1	1911	51,020	50,520.00 G[I]		39,829.81	10,690.19
Physical investigations	do	36	422	1	1911	15,255			12,691.96	2,563.04
Special seeds and plants	do	36	422	1	1911	16,650			14,145.57	2,504.43
Seed testing laboratories	do	36	422	1	1911	25,830			22,741.37	3,088.63
Grain investigations	do	36	422	1	1911	61,925	62,675 EGI		54,511.32	8,163.68
Tobacco investigations	do	36	422	1	1911	22,330	21,830.00 F[I]		18,174.49	3,655.51
General plant breeding	do	36	422	1	1911	13,700			10,458.34	3,241.66
Paper plant investigations	do	36	422	1	1911	8,775	9,575.00 KS		8,507.72	1,067.28
Alkali and drought resistant plants	do	36	422	1	1911	17,500			13,045.78	4,454.22
Sugar plant investigations	do	36	422	1	1911	23,075			18,212.59	4,862.41

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
BUREAU OF PLANT INDUSTRY—continued.										
General expenses, Bureau of Plant Industry—Continued.										
Taxonomic and range investigations	May 26, 1910	36	422	1	1911	$17,650			$15,270.15	$2,379.85
Farm management	do	36	422	1	1911	130,060	$130,510.00 NF^{I}K^{I}		114,025.27	16,484.73
Farmers' cooperative demonstration work	do	36	422	1	1911	240,155	239,491.00 U		202,657.31	36,833.69
Dry land agriculture	do	36	422	1	1911	31,730			26,884.15	4,845.85
Western agricultural extension	do	36	422	1	1911	74,380			66,825.30	7,554.70
Pomological investigations	do	36	422	1	1911	71,615	71,779.00 U		60,392.87	11,386.13
Experimental gardens and grounds	do	36	423	1	1911	13,540	14,894.00 DF		13,752.47	1,141.53
Arlington farm and horticulture	do	36	423	1	1911	34,930	36,630.00 QG^{I}		31,512.51	5,117.49
South Texas garden	do	36	423	1	1911	9,100			8,908.97	191.03
Administrative and miscellaneous	do	36	423	1	1911	42,811	41,007.00 FGIQ		36,569.18	4,437.82
Purchase and distribution of valuable seeds	do	36	423, 424	1	1911			$309,590.00	279,281.61	30,308.39
Congressional seed distribution	do	36	423, 424	1	1911	265,710			239,844.97	25,865.03
Foreign seed and plant introduction	do	36	424	1	1911	43,880			39,436.64	4,443.36
Investigating the chestnut tree bark disease, 1911–12	Mar. 4, 1911	36	1264	1				5,000.00	812.31	4,187.69
BUREAU OF CHEMISTRY.										
General expenses, Bureau of Chemistry	May 26, 1910	36	431, 432	1	1911			816,340.00	657,766.56	158,573.44
Laboratory, miscellaneous expenses	do	36	431	1	1911	36,000			22,969.51	13,030.49
Laboratory, salaries and rent	do	36	431	1	1911	73,000			66,467.97	6,532.03
Laboratory, American food products	do	36	431	1	1911	5,000			4,523.24	476.76
Food and drugs act, salaries in Washington	do	36	432	1	1911	175,000			165,134.56	9,865.44
Food and drugs act, salaries out of Washington ($287,340)	do	36	432	1	1911	232,340	247,340.00 A		221,684.85	25,655.15
Food and drugs act, miscellaneous expenses ($240,000)	do	36	432	1	1911	220,000	205,000.00 A		126,901.70	78,098.30
Allotted to referee board:										
Food and drugs act, salaries out of Washington	do	36	432	1	1911	55,000	53,500.00 H^{I}		30,153.40	23,346.60
Food and drugs act, miscellaneous expenses	do	36	432	1	1911	20,000	21,500.00 H^{I}		19,931.33	1,568.67
BUREAU OF SOILS.										
General expenses, Bureau of Soils	May 26, 1910	36	432	1	1911			193,600.00	173,113.17	20,486.83
Soil laboratory investigations	do	36	432	1	1911	48,000	48,125.00 D^{I}		44,477.86	3,647.14

Soil water investigations	do	36	432	1	1911	5,000	4,675.00 D I		4,136.68	538.32
Soil survey	do	36	432	1	1911	135,160			120,458.00	14,702.00
Administrative expenses	do	36	432	1	1911	5,440	5,640.00 D I		4,040.63	1,599.37
General expenses, Bureau of Soils, 1911-12	Mar. 4, 1911	36	1256	1				2,500.00	1,844.87	655.13
BUREAU OF ENTOMOLOGY.										
General expenses, Bureau of Entomology	May 26, 1910	36	433	1	1911			202,900.00	178,079.81	24,820.19
Deciduous fruit insects	do	36	433	1	1911	40,600			34,156.47	6,443.53
Cereal and forage insects	do	36	433	1	1911	25,000			22,844.53	2,155.47
Southern field crop insects	do	36	433	1	1911	47,000			41,191.65	5,808.35
Forest insects	do	36	433	1	1911	14,000	15,400.00 B		14,149.23	1,250.77
Truck crop and stored product insects	do	36	433	1	1911	16,250	17,875.00 H		15,562.34	2,312.66
Bee culture	do	36	433	1	1911	10,000			9,386.41	613.59
Citrus fruit insects	do	36	433	1	1911	16,500	14,875.00 H		11,161.05	3,713.95
White-fly investigations	do	36	433	1	1911	5,000			4,753.10	246.90
Miscellaneous insects	do	36	433	1	1911	28,550	27,150.00 B		24,875.03	2,274.97
Preventing spread of moths, Bureau of Entomology	do	36	334	1	1911			300,000.00	285,046.84	14,953.16
General expenses, Bureau of Entomology, 1911-1912	Mar. 4, 1911	36	1257	1				10,000.00	4,789.58	5,210.42
BUREAU OF BIOLOGICAL SURVEY.										
General expenses, Bureau of Biological Survey	May 26, 1910	36	434	1	1911			71,520.00	59,114.01	12,405.99
Game preservation	do	36	434	1	1911	9,420			6,619.37	2,800.63
Maintenance of mammal and bird reservations	do	36	434	1	1911	7,000			5,048.09	1,951.91
Food habits of birds and mammals	do	36	434	1	1911	25,000			20,944.82	4,055.18
Biological investigations	do	36	434	1	1911	18,000	18,100.00 B I		16,544.82	1,555.18
Administrative expenses	do	36	433	1	1911	12,100	12,000.00 B I		9,956.91	2,043.09
Protection and removal of elk in Wyoming	Mar. 4, 1911	36	1258	1				20,000.00	995.38	19,004.62
DIVISION OF PUBLICATIONS.										
General expenses, Division of Publications[1]	May 26, 1910	36	435, 436	1	1911			30,000.00	22,131.47	7,868.53
Rent in Washington	do	36	435	1	1911	5,000			4,583.33	416.67
Labor-saving machinery, etc	do	36	435	1	1911	3,000			2,197.15	802.85
Stationery and materials	do	36	435	1	1911	11,500			7,672.42	3,827.58
Furniture and fixtures	do	36	436	1	1911	1,000			608.41	391.59
Photographic equipment	do	36	436	1	1911	4,000			3,839.46	160.54
Gas, electricity, etc	do	36	436	1	1911	1,500			699.48	800.52
Wagons, horses, etc	do	36	436	1	1911	1,000			166.69	833.31
Miscellaneous expenses	do	36	436	1	1911	3,000			2,364.53	635.47
BUREAU OF STATISTICS.										
General expenses, Bureau of Statistics	May 26, 1910	36	436	1	1911			115,620.00	91,344.10	24,275.90
Administrative expenses	do	36	436	1	1911	24,920	24,119.25 LO		20,110.90	4,008.35
Special field agents	do	36	436	1	1911	56,000	53,600.75 CP		44,579.82	9,020.93
State statistical agents	do	36	436	1	1911	30,200	33,200.00 COP		22,749.47	10,450.53
Special investigations	do	36	436	1	1911	2,000	2,200.00 L		1,622.71	577.29
Cost production farm products	do	36	436	1	1911	2,500			2,281.20	218.80

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[1] Congress also appropriated in the sundry civil bill for printing and binding, $460,000.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
OFFICE OF EXPERIMENT STATIONS.										
Agricultural experiment stations ($862,400 [1])	May 26, 1910				1911			$142,400.00	$125,816.74	$16,583.26
Agricultural experiment stations	do	36	437, 438	1	1911	$33,400			30,533.97	2,866.03
Farmers' institutes	do	36	438	1	1911	10,000			8,094.93	1,905.07
Stations in Alaska	do	36	438	1	1911	28,000			28,000.00	
Station in Hawaii	do	36	438	1	1911	28,000			28,000.00	
Station in Porto Rico (including $5,000 for coffee investigations)	do	36	438	1	1911	28,000			28,000.00	
Station on island of Guam	do	36	438	1	1911	15,000			13,732.38	1,267.62
Nutrition investigations	do	36	438	1	1911			10,000.00	9,538.07	461.93
Irrigation investigations	do	36	438	1	1911			70,380.00	69,072.68	1,307.32
Drainage investigations	do	36	439	1	1911			78,860.00	69,178.66	9,681.34
OFFICE OF PUBLIC ROADS.										
General expenses, Office of Public Roads	May 26, 1910	36	439	1	1911			92,980.00	81,815.52	11,164.48
Road management	do	36	439	1	1911	16,000			14,437.19	1,562.81
Investigating road building and maintenance	do	36	439	1	1911	43,000			36,803.56	6,196.44
Road material	do	36	439	1	1911	23,280	$22,400.00 CI EI		21,184.69	1,215.31
Administrative expenses	do	36	439	1	1911	10,700	11,580.00 CI EI		9,390.08	2,189.92
Total for main department, exclusive of Weather Bureau and Forest Service								9,682,476.00	8,129,524.06	1,552,951.94
WEATHER BUREAU.										
Salaries, Weather Bureau	May 26, 1910	36	417	1	1911			199,427.50	190,870.53	8,556.97
Contingent expenses, Weather Bureau	do	36	418	1	1911			25,000.00	21,131.98	3,868.02
General expenses, Weather Bureau	do	36	418, 419	1	1911			1,280,332.50	992,392.84	287,939.66
Station salaries	do	36	418	1	1911	620,410			568,082.53	52,327.47
Miscellaneous expenses	do	36	418	1	1911	94,000	99,000.00 M		79,979.05	19,020.95
Instruments, etc	do	36	418	1	1911	30,000	33,000.00 M		24,912.42	8,087.58
Sand Key building	do	36	418	1	1911	15,000			504.20	14,495.80
Rents and repairs	do	36	418	1	1911	82,500	84,000.00 M		63,676.58	20,323.42
Traveling expenses	do	36	418	1	1911	22,000	20,500.00 X		16,613.52	3,886.48
Telephoning and telegraphing	do	36	418	1	1911	265,700	268,700.00 MX		137,507.80	131,192.20

Line and cable repairs	do	36	418	1	1911	4,000			995.99	3,004.01
Investigations and substations	do	36	418	1	1911	120,000	108,000.00 M		74,466.15	33,533.85
Printing office	do	36	418	1	1911	40,000	26,722.50		25,654.60	2,067.90
Total for Weather Bureau								1,504,760.00	1,204,395.35	300,364.65
Grand total								17,278,976.10	14,759,292.08	2,519,684.02
FISCAL YEAR 1912.										
Salaries, Department of Agriculture (Forest Service included in main caption)	Mar. 4, 1911	36	1235	1	1912			2,318,680.00	2,100,353.41	218,326.59
Improvement of national forests	do	36	1253-1254	1	1912			500,000.00	461,515.61	38,484.39
General expenses, Forest Service, 1911-12	do	36	1252	1	1912			70,000.00	70,000.00	
General expenses, Forest Service	do	36	1246, 1253	1	1912			2,644,420.00	2,224,924.77	419,495.23
Fighting forest fires	do	36	1252	1	1912	80,000	2,796.99	82,796.99	80,146.99	2,650.00
Maintenance and supplies	do	36	1252	1	1912	198,080	7,394.19	205,474.19	128,942.95	76,531.24
Forest products	do	36	1252	1	1912	177,040	914.73	176,125.27	151,957.67	24,167.60
National forest range investigations	do	36	1252	1	1912	18,420	775.00	19,195.00	14,241.18	4,953.82
Silviculture, national forests	do	36	1252	1	1912	166,640	5,946.83	172,586.83	152,089.19	20,497.64
Management of forests	do	36	1252-1253	1	1912	84,528	11,409.67	73,118.33	62,663.28	10,455.05
Market and miscellaneous investigations	do	36	1253	1	1912	33,760	4,457.37	29,302.63	20,322.65	8,979.98
Absaroka National Forest	do	36	1247	1	1912	11,520	5,407.86	6,112.14	5,122.28	989.86
Alamo National Forest	do	36	1247	1	1912	8,770	3,303.27	5,466.73	4,930.58	536.15
Angeles National Forest	do	36	1247	1	1912	19,983	7,910.26	12,072.74	9,451.43	2,621.31
Apache National Forest	do	36	1247	1	1912	11,677	652.00	11,025.00	8,045.09	2,979.91
Arapaho National Forest	do	36	1247	1	1912	11,484	1,352.39	12,836.39	11,264.55	1,571.84
Arkansas National Forest	do	36	1247	1	1912	13,783	548.28	13,234.72	11,402.21	1,832.51
Ashley National Forest	do	36	1247	1	1912	10,184	6,145.25	4,038.75	3,243.70	795.05
Battlement National Forest	do	36	1247	1	1912	7,584	2,433.38	5,150.62	4,563.66	586.96
Beartooth National Forest	do	36	1247	1	1912	10,305	3,961.81	6,343.19	5,933.40	409.79
Beaverhead National Forest	do	36	1247	1	1912	12,700	5,870.00	6,830.00	5,781.13	1,048.87
Bighorn National Forest	do	36	1247	1	1912	18,538	2,424.34	16,113.66	8,902.24	7,211.42
Bitterroot National Forest	do	36	1247	1	1912	22,847	13,718.00	9,129.00	7,749.40	1,379.60
Blackfeet National Forest	do	36	1247	1	1912	18,262	1,840.33	16,421.67	14,811.16	1,610.51
Black Hills National Forest	do	36	1247	1	1912	9,420	2,136.00	7,284.00	5,588.15	1,695.85
Boise National Forest	do	36	1247	1	1912	9,173	1,429.34	7,743.66	6,307.48	1,436.18
Bonneville National Forest	do	36	1247	1	1912	3,395	638.50	2,756.50	2,397.42	359.08
Bridger National Forest	do	36	1247	1	1912	4,899	2,665.67	2,233.33	1,978.19	255.14
Cabinet National Forest	do	36	1247	1	1912	18,341	4,454.58	13,886.42	13,127.82	758.60
Cache National Forest	do	36	1247	1	1912	5,953	842.66	5,110.34	3,642.03	1,468.31
California National Forest	do	36	1247	1	1912	12,091	2,691.00	9,400.00	7,831.08	1,568.92
Caribou National Forest	do	36	1247	1	1912	3,702	561.42	3,140.58	2,387.09	753.49
Carson National Forest	do	36	1247	1	1912	15,920	518.05	16,438.05	14,571.04	1,867.01
Cascade National Forest	do	36	1247	1	1912	14,084	4,249.00	9,835.00	9,552.14	282.86
Challis National Forest	do	36	1247	1	1912	8,679	3,902.33	4,776.67	3,740.71	1,035.96
Chelan National Forest	do	36	1248	1	1912	10,407	3,728.67	6,678.33	6,311.05	367.28
Chiricahua National Forest	do	36	1248	1	1912	5,459	1,472.27	6,931.27	4,447.57	2,483.70
Chugach National Forest	do	36	1248	1	1912	25,280	11,865.23	13,414.77	11,542.05	1,872.72

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[1] This includes $720,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department. Congress also appropriated $720,000 as a permanent appropriation for State experiment stations under the Adams bill, to be paid through the Treasury Department. Total to be paid through the Treasury Department for State experiment stations, $1,440,000.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
General expenses, Forest Service—Continued.										
Clearwater National Forest	Mar. 4, 1911	36	1248	1	1912	$14,843	$3,134.92	$11,708.08	$9,569.25	$2,138.83
Cleveland National Forest	do	36	1248	1	1912	17,937	10,460.27	7,476.73	8,361.84	[1] 885.11
Cochetopa National Forest	do	36	1248	1	1912	9,540	3,036.00	6,504.00	5,425.00	1,079.00
Coconino National Forest	do	36	1248	1	1912	14,942	252.23	15,194.23	13,391.34	1,802.89
Coeur d'Alene National Forest	do	36	1248	1	1912	16,155	597.78	16,752.78	12,313.76	4,439.02
Colorado National Forest	do	36	1248	1	1912	10,528	3,471.72	7,056.28	6,109.61	946.67
Columbia National Forest	do	36	1248	1	1912	16,472	951.12	15,520.88	12,024.45	3,496.43
Colville National Forest	do	36	1248	1	1912	13,525	4,339.00	9,186.00	8,276.02	909.98
Coronado National Forest	do	36	1248	1	1912	15,517	10,725.00	4,792.00	4,044.36	747.64
Crater National Forest	do	36	1248	1	1912	20,355	691.85	21,046.85	17,560.75	3,486.10
Crook National Forest	do	36	1248	1	1912	8,756	4,889.00	3,867.00	3,023.67	843.33
Custer National Forest	do	36	1248	1	1912	6,386	354.34	6,031.66	5,286.84	744.82
Dakota National Forest	do	36	1248	1	1912	933	308.00	625.00	533.32	91.68
Datil National Forest	do	36	1248	1	1912	18,304	7,037.61	11,266.39	8,250.66	3,015.73
Deerlodge National Forest	do	36	1248	1	1912	16,540	2,115.00	18,655.00	15,592.04	3,062.96
Deschutes National Forest	do	36	1248	1	1912	8,258	1,292.14	9,550.14	7,810.55	1,739.59
Dixie National Forest	do	36	1248	1	1912	4,237	42.13	4,279.13	3,406.81	872.32
Durango National Forest	do	36	1248	1	1912	11,111	4,621.00	6,490.00	5,357.96	1,132.04
Eldorado National Forest	do	36	1248	1	1912	10,208	1,708.00	8,500.00	6,921.37	1,578.63
Fillmore National Forest	do	36	1248	1	1912	5,477	1,196.00	4,281.00	3,184.86	1,096.14
Fishlake National Forest	do	36	1248	1	1912	3,889	364.00	3,525.00	2,124.28	1,400.72
Flathead National Forest	do	36	1248	1	1912	28,151	579.20	27,571.80	24,473.42	3,098.38
Florida National Forest	do	36	1248	1	1912	6,970	1,290.00	8,260.00	6,775.70	1,484.30
Fremont National Forest	do	36	1248	1	1912	12,592	3,257.00	9,335.00	8,345.41	989.59
Gallatin National Forest	do	36	1248	1	1912	12,505	6,897.83	5,607.17	4,930.51	676.66
Gila National Forest	do	36	1248	1	1912	17,606	984.00	18,590.00	15,833.03	2,756.97
Gunnison National Forest	do	36	1248	1	1912	8,813	459.50	9,272.50	6,479.45	2,793.05
Harney National Forest	do	36	1249	1	1912	8,217	1,467.00	6,750.00	5,253.58	1,496.42
Hayden National Forest	do	36	1249	1	1912	7,626	2,521.00	5,105.00	4,146.41	958.59
Helena National Forest	do	36	1249	1	1912	10,955	4,151.17	6,803.83	5,877.55	926.28
Holy Cross National Forest	do	36	1249	1	1912	8,469	2,824.00	5,645.00	4,796.51	848.49
Humboldt National Forest	do	36	1249	1	1912	15,180	6,698.55	8,481.45	7,190.37	1,291.08
Idaho National Forest	do	36	1249	1	1912	10,720	2,800.00	7,920.00	6,972.47	947.53
Inyo National Forest	do	36	1249	1	1912	9,503	2,166.83	7,336.17	6,493.06	843.11
Jefferson National Forest	do	36	1249	1	1912	11,930	4,503.22	7,426.78	5,824.48	1,602.30
Jemez National Forest	do	36	1249	1	1912	15,409	2,288.05	13,120.95	11,012.72	2,108.23
Kaibab National Forest	do	36	1249	1	1912	6,982	1,760.06	5,221.94	4,595.70	626.24
Kaniksu National Forest	do	36	1249	1	1912	20,568	1,499.33	19,068.67	14,887.99	4,180.68
Kansas National Forest	do	36	1249	1	1912	2,263	548.00	1,715.00	1,556.03	158.97
Kern National Forest	do	36	1249	1	1912	16,059	5,960.11	10,098.89	9,194.65	904.24

Klamath National Forest	Mar. 4, 1911	36	1249	1	1912	19,192	3,065.98		22,257.98	18,184.93	4,073.05
Kootenai National Forest	do	36	1249	1	1912	25,977	1,128.00		24,849.00	23,105.41	1,743.59
La Sal National Forest	do	36	1249	1	1912	4,719	471.90		5,190.90	5,004.48	186.42
Lassen National Forest	do	36	1249	1	1912	12,865	35.18		12,829.82	11,555.92	1,273.90
Leadville National Forest	do	36	1249	1	1912	14,608	8,243.00		6,365.00	5,437.84	927.16
Lemhi National Forest	do	36	1249	1	1912	6,609	209.50		6,818.50	5,381.40	1,437.10
Lewis and Clark National Forest	do	36	1249	1	1912	12,917	4,443.67		8,473.33	7,494.66	978.67
Lincoln National Forest	do	36	1249	1	1912	6,982	3,737.67		3,244.33	2,799.58	444.75
Lolo National Forest	do	36	1249	1	1912	18,839	2,150.94		16,688.06	14,142.51	2,545.55
Loquillo National Forest	do	36	1249	1	1912	2,408	95.00		2,313.00	278.15	2,034.85
Madison National Forest	do	36	1249	1	1912	14,121	5,824.75		8,296.25	7,215.20	1,081.05
Malheur National Forest	do	36	1249	1	1912	12,790	5,188.06		7,601.94	6,912.66	689.28
Manti National Forest	do	36	1249	1	1912	6,807	680.70		7,487.70	5,928.32	1,559.38
Manzano National Forest	do	36	1249	1	1912	3,963	1,183.00		2,780.00	1,974.39	805.61
Marquette National Forest	do	36	1249	1	1912	2,167	1,093.85		1,073.15	1,494.40	[2] 421.25
Medicine Bow National Forest	do	36	1249	1	1912	14,307	3,688.55		17,995.55	13,330.68	4,664.87
Michigan National Forest	do	36	1249	1	1912	2,829	221.00		3,050.00	2,763.41	286.59
Minam National Forest	do	36	1250	1	1912	6,356	2,030.07		4,325.93	2,975.01	1,350.92
Minnesota National Forest	do	36	1250	1	1912	10,720	2,809.00		7,911.00	7,099.23	811.77
Minidoka National Forest	do	36	1250	1	1912	4,484	157.00		4,641.00	3,103.75	1,537.25
Missoula National Forest	do	36	1250	1	1912	20,561	9,781.99		10,779.01	9,618.23	1,160.78
Moapa National Forest	do	36	1250	1	1912	1,101	200.00		901.00	422.14	478.86
Modoc National Forest	do	36	1250	1	1912	12,219	4,019.00		8,200.00	7,254.48	945.52
Mono National Forest	do	36	1250	1	1912	10,924	6,674.00		4,250.00	3,393.35	856.65
Monterey National Forest	do	36	1250	1	1912	2,534	253.40		2,787.40	2,436.54	350.86
Montezuma National Forest	do	36	1250	1	1912	8,956	1,421.31		7,534.69	6,117.98	1,416.71
Nebo National Forest	do	36	1250	1	1912	1,558	404.00		1,154.00	829.44	324.56
Nebraska National Forest	do	36	1250	1	1912	2,919	237.34		2,681.66	2,329.15	352.51
Nevada National Forest	do	36	1250	1	1912	7,139	1,784.94		5,354.06	4,097.51	1,256.55
Nezperce National Forest	do	36	1250	1	1912	23,036	10,837.08		12,198.92	11,048.88	1,150.04
Ochoco National Forest	do	36	1250	1	1912	11,641	2,481.00		9,160.00	7,420.86	1,739.14
Okanogan National Forest	do	36	1250	1	1912	16,745	3,501.78		13,243.22	12,471.59	771.63
Olympic National Forest	do	36	1250	1	1912	15,962	1,825.33		14,136.67	12,475.69	1,660.98
Oregon National Forest	do	36	1250	1	1912	19,462	1,033.72		18,428.28	14,710.57	3,717.71
Ozark National Forest	do	36	1250	1	1912	11,496	760.00		12,256.00	11,639.05	616.95
Palisade National Forest	do	36	1250	1	1912	9,739	2,829.00		6,910.00	5,404.08	1,505.92
Paulina National Forest	do	36	1250	1	1912	13,802	5,530.22		8,271.78	7,332.86	938.92
Payette National Forest	do	36	1250	1	1912	15,158	885.01		14,272.99	11,837.17	2,435.82
Pecos National Forest	do	36	1250	1	1912	11,737	589.66		12,326.66	9,642.69	2,683.97
Pend d'Oreille National Forest	do	36	1250	1	1912	14,446	373.99		14,819.99	14,069.75	750.24
Pike National Forest	do	36	1250	1	1912	17,184	1,882.00		15,302.00	13,438.32	1,863.68
Plumas National Forest	do	36	1250	1	1912	17,900	726.30		17,173.70	15,152.60	2,021.10
Pocatello National Forest	do	36	1250	1	1912	3,327	2,461.00		866.00	693.12	172.88
Powell National Forest	do	36	1250	1	1912	4,911	4,101.00		810.00	428.95	381.05
Prescott National Forest	do	36	1251	1	1912	6,248	1,433.00		4,815.00	4,585.95	229.05
Rainier National Forest	do	36	1251	1	1912	13,603	2,098.80		11,504.20	9,337.47	2,166.73
Rio Grande National Forest	do	36	1251	1	1912	10,750	2,245.69		8,504.31	7,276.94	1,227.37
Routt National Forest	do	36	1251	1	1912	11,225	1,303.39		9,921.61	8,252.05	1,669.56
Salmon National Forest	do	36	1251	1	1912	17,449	6,568.75		10,880.25	9,402.68	1,477.57
San Isabel National Forest	do	36	1251	1	1912	9,546	3,662.55		5,883.45	5,178.63	704.82

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[1] $2,140.11 to be transferred from Bureau of Animal Industry.

[2] $484.64 to be transferred from War Department.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
General expenses, Forest Service—Continued.										
San Juan National Forest	Mar. 4, 1911	36	1251	1	1912	$11,791	$5,018.23	$6,772.77	$5,665.59	$1,107.18
Santa Barbara National Forest	do	36	1251	1	1912	14,157	3,190.59	10,966.41	9,381.38	1,585.03
Santiam National Forest	do	36	1251	1	1912	11,028	211.89	10,816.11	8,723.59	2,092.52
Sawtooth National Forest	do	36	1251	1	1912	8,487	2,382.00	6,105.00	4,902.68	1,202.32
Selway National Forest	do	36	1251	1	1912	20,962	3,932.06	17,029.94	15,667.97	1,361.97
Sequoia National Forest	do	36	1251	1	1912	18,719	6,279.00	12,440.00	10,598.89	1,841.11
Sevier National Forest	do	36	1251	1	1912	3,046	304.60	3,350.60	3,014.65	335.95
Shasta National Forest	do	36	1251	1	1912	17,816	1,434.00	19,250.00	15,862.49	3,387.51
Shoshone National Forest	do	36	1251	1	1912	7,710	771.25	6,938.75	5,908.85	1,029.90
Sierra National Forest	do	36	1251	1	1912	19,823	6,440.70	13,382.30	11,534.34	1,847.96
Sioux National Forest	do	36	1251	1	1912	5,634	1,248.73	4,385.27	3,686.18	699.09
Siskiyou National Forest	do	36	1251	1	1912	15,015	3,455.00	11,560.00	10,340.31	1,219.69
Sitgreaves National Forest	do	36	1251	1	1912	12,881	1,482.27	11,398.73	8,531.92	2,866.81
Siuslaw National Forest	do	36	1251	1	1912	10,491	1,561.64	8,929.36	7,628.83	1,300.53
Snoqualmie National Forest	do	36	1251	1	1912	20,007	3,662.00	16,345.00	14,958.81	1,386.19
Sopris National Forest	do	36	1251	1	1912	10,019	3,273.77	6,745.23	5,218.87	1,526.36
Saint Joe National Forest	do	36	1251	1	1912	21,536	8,643.86	30,179.86	23,817.40	6,362.46
Stanislaus National Forest	do	36	1251	1	1912	16,718	2,789.80	13,928.20	13,563.47	364.73
Sundance National Forest	do	36	1251	1	1912	3,599	835.66	2,763.34	2,362.86	400.48
Superior National Forest	do	36	1251	1	1912	10,533	2,504.67	8,028.33	5,959.41	2,068.92
Tahoe National Forest	do	36	1251	1	1912	18,647	2,597.00	16,050.00	14,338.18	1,711.82
Targhee National Forest	do	36	1251	1	1912	11,424	350.00	11,774.00	10,885.79	888.21
Teton National Forest	do	36	1251	1	1912	9,125	2,697.67	6,427.33	4,273.69	2,153.64
Toiyabe National Forest	do	36	1251	1	1912	7,223	1,324.50	5,898.50	5,377.68	520.82
Tongass National Forest	do	36	1251	1	1912	23,041	1,282.43	21,758.57	19,886.03	1,872.54
Tonto National Forest	do	36	1252	1	1912	7,433	1,335.83	6,097.17	5,351.51	745.66
Trinity National Forest	do	36	1252	1	1912	23,113	1,107.00	24,220.00	21,224.13	2,995.87
Tusayan National Forest	do	36	1252	1	1912	11,918	771.00	11,147.00	9,909.87	1,237.13
Uinta National Forest	do	36	1252	1	1912	6,090	1,033.35	5,056.65	4,014.99	1,041.66
Umatilla National Forest	do	36	1252	1	1912	8,517	596.00	7,921.00	6,656.33	1,264.67
Umpqua National Forest	do	36	1252	1	1912	14,408	3,315.10	11,092.90	9,363.08	1,729.82
Uncompahgre National Forest	do	36	1252	1	1912	10,756	2,856.41	7,899.59	6,747.00	1,152.59
Wallowa National Forest	do	36	1252	1	1912	12,188	3,123.00	9,065.00	7,679.34	1,385.66
Wasatch National Forest	do	36	1252	1	1912	2,396	851.00	1,545.00	1,487.43	57.57
Washakie National Forest	do	36	1252	1	1912	7,595	4,404.00	3,191.00	2,689.66	501.34
Washington National Forest	do	36	1252	1	1912	14,945	5,679.00	9,266.00	8,175.07	1,090.93
Weiser National Forest	do	36	1252	1	1912	14,066	6,891.00	7,175.00	6,203.25	971.75
Wenaha National Forest	do	36	1252	1	1912	9,805	4,166.99	5,638.01	5,126.41	511.60
Wenatchee National Forest	do	36	1252	1	1912	11,478	4,869.67	6,608.33	5,997.21	611.12
White River National Forest	do	36	1252	1	1912	11,779	3,135.50	8,643.50	7,334.66	1,308.84

Whitman National Forest	do	36	1252	1	1912	17,521	4,108.26	13,412.74	11,298.97	2,113.77
Wichita National Forest	do	36	1252	1	1912	11,978	8,489.23	3,488.77	2,232.76	1,256.01
Wyoming National Forest	do	36	1252	1	1912	9,438	775.00	8,663.00	7,402.76	1,260.24
Zuni National Forest	do	36	1252	1	1912	5,287	3,100.00	2,187.00	1,457.80	729.20
General administration, 15 per cent	do	36	1253	1	1912			400,718 38	359,805.69	40,912.69
SPECIAL APPROPRIATIONS.										
Refunds to depositors, excess of deposits, national forests fund								64,413.56	47,716.54	16,697.02
Cooperative work, forest investigations								7,285.11	2,959.65	4,325.46
National Bison Range								707.57	104.98	602.59
Burial expenses, etc., and relief of dependent relatives of fire fighters on national forests, 1911-12	Mar. 4, 1911	36	1312	1				15,000.00	6,754.05	8,245.95
Reimbursement to temporary employees of forest service for time lost fighting fires on national forests	do	36	1312	1				5,450.00	5,053.67	396.33
Reimbursement for horses, etc., lost fighting fires on national forests	do	36	1312	1				2,742.90	2,667.90	75.00
Fighting and preventing forest fires in emergency	do	36	1264	1				1,000,000.00	37,576.34	962,423.66
Total for Forest Service								6,628,699.14	4,959,626.92	1,669,072.22
Salaries, Department of Agriculture (not including Weather Bureau)	Mar. 4, 1911	36	1235	1	1912			4,149,410.00	4,036,797.57	112,612.43
Officers and clerks	do	36	1235, 1236	1	1912	4,133,210			4,023,768.25	109,441.75
Extra labor	do	36	1236	1	1912	16,200			13,029.32	3,170.68
Contingent expenses, Department of Agriculture	do	36	1261	1	1912			110,000.00	88,565.09	21,434.91
Library, Department of Agriculture	do	36	1261	1	1912			15,500.00	12,658.66	2,841.34
Enforcement of the insecticide act	do	36	1264	1	1912			87,000.00	33,191.31	53,808.69
National Forest Reservation Commission	Mar. 1, 1911	36	963	14	1912			25,000.00	125.25	24,874.75
Acquisition of lands for protection of watersheds of navigable streams	do	36	961	3	1912			2,000,000.00	101,106.03	1,898,893.97
Cooperative fire protection of forested watersheds of navigable streams	do	36	961	2	1912			200,000.00	46,627.53	153,372.47
BUREAU OF ANIMAL INDUSTRY.										
General expenses, Bureau of Animal Industry	Mar. 4, 1911	36	1239, 1240	1	1912			1,192,300.00	1,052,006.70	140,293.30
Inspection and quarantine	do	36	1239, 1240	1	1912	592,700	602,700.00 G[1]		538,713.21	63,986.79
Eradicating cattle ticks	do	36	1240	1	1912	250,000	240,000.00 G[1]		215,921.68	24,078.32
Dairy industry	do	36	1240	1	1912	150,000	148,675.00 U		123,149.52	25,525.48
Animal husbandry	do	36	1240	1	1912	47,480	46,155.00 U		38,412.37	7,742.63
Diseases of animals	do	36	1240	1	1912	78,680			65,083.06	13,596.94
Experimental farm at Beltsville	do	36	1240	1	1912	10,000	11,000.00 U		9,859.68	1,140.32
Construction of buildings at Bethesda and Beltsville	do	36	1240	1	1912	16,500	18,150.00 U		16,856.27	1,293.73
Administrative expenses	do	36	1240	1	1912	46,940			44,010.91	2,929.09

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
BUREAU OF ANIMAL INDUSTRY—continued.										
Cooperative experiments in animal feeding and breeding	Mar. 4, 1911	36	1240	1	1912			$50,000.00	$40,729.10	$9,270.90
Meat inspection, Bureau of Animal Industry (permanent appropriation)	June 30, 1906	34	674	1	1912			3,000,000.00	2,719,481.52	280,518.48
General expenses, Bureau of Animal Industry, 1911-12 (appropriated, $65,000), balance available July 1, 1911	Mar. 4, 1911	36	1240	1	1912			64,989.15	47,371.42	17,617.73
BUREAU OF PLANT INDUSTRY.										
General expenses, Bureau of Plant Industry, 1912	do	36	1242, 1243	1	1912			1,441,536.00	1,227,805.43	213,730.57
Pathological laboratory	do	36	1242	1	1912	$22,930	$22,855.00 CTI^{I}K^{I}		20,555.02	2,299.98
Fruit diseases	do	36	1242	1	1912	42,075	39,825.00 EMNA^{I}I^{I}K		31,841.87	7,983.13
Forest pathology	do	36	1242	1	1912	24,670	27,110.00 ADFM		24,621.38	2,488.62
Cotton and truck diseases	do	36	1242	1	1912	24,860			20,877.56	3,982.44
Crop physiology	do	36	1242	1	1912	33,015	36,315.00 V		30,933.40	5,381.60
Bacteriology and nutrition	do	36	1242	1	1912	26,145	26,095.00 N^{I}		21,048.87	5,046.13
Crop acclimatization	do	36	1242	1	1912	34,670			31,905.52	2,764.48
Drug and other plants	do	36	1242	1	1912	46,930	46,255.00 TOI		40,024.97	6,230.03
Crop technology	do	36	1242	1	1912	10,610	11,671.00 K		10,199.38	1,471.62
Cotton standardization	do	36	1242	1	1912	32,350	29,115.00 KORV XP^{I}		21,956.21	7,158.79
Grain standardization	do	36	1242	1	1912	57,080			50,190.02	6,889.98
Physical investigations	do	36	1242	1	1912	16,375	16,323.00 P^{I}		13,409.45	2,913.55
Special seeds and plants	do	36	1242	1	1912	13,110	14,116.00 GW		12,428.48	1,687.52
Seed-testing laboratories	do	36	1242	1	1912	26,650	27,470.00 PXB^{I}P^{I}		24,256.61	3,213.39
Grain investigations	do	36	1242	1	1912	77,925	78,244.00 FLUY		70,877.64	7,366.36
Tobacco investigations	do	36	1242	1	1912	26,630	28,180.00 BZ		23,514.61	4,665.39
Forage crop investigations	do	36	1242	1	1912	20,000			12,473.96	7,526.04
Paper-plant investigations	do	36	1243	1	1912	8,000	8,800.00 O		7,520.64	1,279.36
Alkali and drought-resistant plants	do	36	1243	1	1912	18,140			13,846.18	4,293.82
Sugar-plant investigations	do	36	1243	1	1912	32,355	31,515.00 A		26,870.07	4,644.93
Taxonomic and range investigations	do	36	1243	1	1912	21,930	20,430.00 D^{I}		18,483.90	1,946.10
Farm management	do	36	1243	1	1912	138,920			122,735.52	16,184.48
Agricultural reconnoissance work in Alaska	do	36	1243	1	1912	4,000			3,302.88	697.12
Farmers' cooperative demonstration work	do	36	1243	1	1912	350,000	345,105.00 ABDLV		300,752.67	44,352.33
Dry-land agriculture	do	36	1243	1	1912	70,000	69,200.00 B^{I}		46,458.97	22,741.03
Western agricultural extension	do	36	1243	1	1912	73,060	73,540.00 A		65,462.34	8,077.66

Pomological investigations	do	36	1243	1	1912	87,735	88,231.00 EY		73,413.78	14,817.22
Experimental gardens and grounds	do	36	1243	1	1912	13,860	15,060.00 C		13,362.87	1,697.13
Arlington farm and horticulture	do	36	1243	1	1912	38,000	39,152.00 RZN^{I}O^{I}P^{I}		31,746.36	7,405.64
South Texas garden	do	36	1243	1	1912	11,260	10,134.00 G		8,436.96	1,697.04
Administrative and miscellaneous	do	36	1243	1	1912	38,251	39,125.00 PVWA^{I}D^{I}		34,297.34	4,827.66
Purchase and distribution of valuable seeds	do	36	1243, 1244	1	1912			289,680.00	270,218.29	19,461.71
Congressional seed distribution	do	36	1244	1	1912	237,160			224,370.95	12,789.05
Foreign seed and plant introduction	do	36	1244	1	1912	52,520			45,847.34	6,672.66
Investigating the chestnut tree bark disease, 1911-12 (appropriated, $5,000), balance available July 1, 1911	do	36	1264	1	1912			4,187.69	3,815.09	372.60
BUREAU OF CHEMISTRY.										
General expenses, Bureau of Chemistry	Mar. 4, 1911	36	1255	1	1912			111,480.00	91,823.70	19,656.30
Laboratory, miscellaneous expenses	do	36	1255	1	1912	36,000			20,233.86	15,766.14
Laboratory, salaries and rent	do	36	1255	1	1912	71,200			67,757.66	3,442.34
Laboratory, American food products	do	36	1255	1	1912	4,280			3,832.18	447.82
Enforcement of the food and drugs act	do	36	1255	1	1912			535,110.00	447,205.75	87,904.25
Allotted to referee board:										
Enforcement of the food and drugs act	do	36	1255	1	1912			75,000.00	45,208.27	29,791.73
BUREAU OF SOILS.										
General expenses, Bureau of soils	Mar. 4, 1911	36	1256	1	1912			211,240.00	193,021.75	18,218.25
Soil laboratory investigations	do	36	1256	1	1912	51,600	51,850.00 H^{I}		50,865.99	984.01
Investigations of fertilizer resources	do	36	1256	1	1912	10,000	. C^{I}M^{I}		9,181.00	819.00
Soil survey	do	36	1256	1	1912	145,000	144,290.00 C^{I}H^{I}M^{I}		129,445.66	14,844.34
Administrative expenses	do	36	1256	1	1912	4,640	5,100.00 H^{I}		3,529.10	1,570.90
General expenses, Bureau of Soils, 1911-12 (appropriated, $2,500), balance available July 1, 1911	do	36	1256	1	1912			655.13	424.64	230.49
BUREAU OF ENTOMOLOGY.										
General expenses, Bureau of Entomology	Mar. 4, 1911	36	1256, 1257	1	1912			246,950.00	222,768.33	24,181.67
Deciduous fruit insects	do	36	1257	1	1912	39,700	41,200.00 H		35,198.41	5,001.59
Cereal and forage insects	do	36	1257	1	1912	40,000			36,477.59	3,522.41
Southern field crop insects	do	36	1257	1	1912	47,160			41,230.24	5,929.76
Forest insects	do	36	1257	1	1912	44,750	43,250.00 H		38,330.48	4,919.52
Truck crop and stored product insects	do	36	1257	1	1912	19,100			17,472.27	1,627.73
Bee culture	do	36	1257	1	1912	15,000			14,733.99	266.01
Citrus fruit insects	do	36	1257	1	1912	21,500			19,969.59	1,530.41
Miscellaneous insects	do	36	1257	1	1912	19,740			18,355.76	1,384.24
Preventing spread of moths, Bureau of Entomology	do	36	1257	1	1912			284,840.00	243,491.17	41,348.83
General expenses, Bureau of Entomology, 1911-12 (appropriated, $10,000), balance available July 1, 1911	do	36	1257	1	1912			5,210.42	4,961.73	248.69

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

Purpose.	Date of appropriation act.	Reference to Statutes at Large.			Fiscal year.	Subappropriations.	Transfer of funds.	Amount appropriated.	Amount disbursed.	Amount unexpended.
		Vol.	Page.	Sec.						
BUREAU OF BIOLOGICAL SURVEY.										
General expenses, Bureau of Biological Survey	Mar. 4, 1911	36	1257, 1258	1	1912			$95,700.00	$71,437.31	$24,262.69
Game preservation	do	36	1258	1	1912	$12,000			8,026.28	3,973.72
Maintenance of mammal and bird reservations	do	36	1258	1	1912	12,000			6,349.85	5,650.15
Game for national reservations	do	36	1258	1	1912	2,500			30.00	2,470.00
Food habits of birds and mammals	do	36	1258	1	1912	35,000			28,468.33	6,531.67
Biological investigations	do	36	1258	1	1912	20,000			17,173.57	2,826.43
Administrative expenses	do	36	1258	1	1912	14,200			11,389.28	2,810.72
Protection and removal of elk in Wyoming (appropriated, $20,000), balance available July 1, 1911	do	36	1258	1				19,004.62	8,775.41	10,229.21
DIVISION OF PUBLICATIONS.										
General expenses, Division of Publications [1]	Mar. 4, 1911	36	1259, 1260	1	1912			30,000.00	21,813.55	8,186.45
Rent in Washington	do	36	1259	1	1912	5,000			4,583.33	416.67
Labor-saving machinery, etc	do	36	1260	1	1912	3,000			2,067.43	932.57
Stationery and materials	do	36	1260	1	1912	11,500			7,753.17	3,746.83
Furniture and fixtures	do	36	1260	1	1912	1,000			717.77	282.23
Photographic equipment	do	36	1260	1	1912	5,000			4,856.89	143.11
Gas, electricity, etc	do	36	1260	1	1912	500			421.03	78.97
Wagons, horses, etc	do	36	1260	1	1912	1,000			280.49	719.51
Miscellaneous expenses	do	36	1260	1	1912	3,000			1,133.44	1,866.51
BUREAU OF STATISTICS.										
General expenses, Bureau of Statistics	Mar. 4, 1911	36	1260	1	1912			122,900.00	97,653.54	25,246.46
Administrative expenses	do	36	1260	1	1912	24,700	$24,950.00 SJ [1]		21,780.97	3,169.03
Special field agents	do	36	1260	1	1912	63,500	61,750.00 SJ [1]		51,617.15	10,132.85
State statistical agents	do	36	1260	1	1912	32,200	33,700.00 S		22,487.42	11,212.58
Special investigations	do	36	1260	1	1912	2,500			1,768.00	732.00
OFFICE OF EXPERIMENT STATIONS.										
Agricultural experiment stations ($1,592,500 [2])	Mar. 4, 1911	36	1261, 1262	1	1912			152,500.00	146,446.17	6,053.83
Agricultural experiment stations	do	36	1261, 1262	1	1912	37,500	37,000.00 L [1]		34,124.20	2,875.80
Farmers' institutes	do	36	1262	1	1912	10,000			8,666.49	1,333.51
Stations in Alaska	do	36	1262	1	1912	30,000	30,500.00 L [1]		30,000.00	500.00

Station in Hawaii	Mar. 4, 1911	36	1262	1	1912	30,000			29,533.20	466.80
Station in Porto Rico	do	36	1262	1	1912	30,000			30,000.00	
Station on Island of Guam	do	36	1262	1	1912	15,000			14,122.28	877.72
Nutrition investigations	do	36	1262	1	1912			15,000.00	14,130.68	869.32
Irrigation investigations	do	36	1262, 1263	1	1912			100,000.00	77,644.04	22,355.96
Drainage investigations	do	36	1263	1	1912			100,000.00	74,526.54	25,473.46
OFFICE OF PUBLIC ROADS.										
General expenses, Office of Public Roads	Mar. 4, 1911	36	1263, 1264	1	1912			126,700.00	108,878.39	17,821.61
Road management	do	36	1263	1	1912	20,000			16,007.91	3,992.09
Investigating road building and maintenance	do	36	1263	1	1912	60,000	54,000.00 IJ		46,977.83	7,022.17
Road material	do	36	1263	1	1912	25,000	23,830.00 E[1]		21,811.90	2,018.10
Field experiments	do	36	1264	1	1912	10,000	16,000.00 IJ		15,270.02	729.98
Administrative expenses	do	36	1264	1	1912	11,700	12,870.00 E[1]		8,810.73	4,059.27
Total for main department, exclusive of Weather Bureau and Forest Service								14,861,893.01	11,550,709.96	3,311,183.05
WEATHER BUREAU.										
Salaries, Weather Bureau	Mar. 4, 1911	36	1236, 1237	1	1912			313,170.00	301,311.31	11,858.69
Contingent expenses, Weather Bureau	do	36	1237	1	1912			25,000.00	20,941.88	4,058.12
General expenses, Weather Bureau	do	36	1237, 1238	1	1912			1,262,080.00	940,403.73	321,676.27
Station salaries	do	36	1237	1	1912	546,580			501,978.19	44,601.81
Miscellaneous expenses	do	36	1237	1	1912	104,000	114,400.00		83,616.05	30,783.95
Instruments, etc	do	36	1237	1	1912	35,000	38,500.00		29,826.94	8,673.06
Key West building	do	36	1237	1	1912	15,000			1,895.00	13,105.00
Rents and repairs	do	36	1238	1	1912	97,500	96,000.00		69,072.82	26,927.18
Traveling expenses	do	36	1238	1	1912	22,000			15,914.81	6,085.19
Telephoning and telegraphing	do	36	1238	1	1912	300,000	298,100.00		148,503.10	149,596.90
Line and cable repairs	do	36	1238	1	1912	4,000			2,601.29	1,398.71
Investigations and substations	do	36	1238	1	1912	120,000	108,000.00		73,136.53	34,863.47
Printing office	do	36	1238	1	1912	18,000	19,500.00		13,859.00	5,641.00
Total for Weather Bureau								1,600,250.00	1,262,656.92	337,593.08
Total exclusive of Forest Service								16,462,143.01	12,813,366.88	3,648,776.13
Total for Forest Service								6,628,699.14	4,959,626.92	1,669,072.22
Grand total								23,090,842.15	17,772,993.80	5,317,848.35

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[1] Congress also appropriated in the sundry civil bill for printing and binding, $470,000. (36 Stat. L., 1447.)

[2] This includes $1,440,000 for State experiment stations under the regular appropriation, to be paid through the Treasury Department.

Statement of appropriations, disbursements, and unexpended balances for the United States Department of Agriculture, etc.—Continued.

RECAPITULATION.

Fiscal year.	Amount appropriated.	Amount disbursed.	Amount unexpended.
1839	$1,000.00	$1,000.00	
1840			
1841			
1842	1,000.00	1,000.00	
1843			
1844	2,000.00	2,000.00	
1845	2,000.00	2,000.00	
1846	3,000.00	3,000.00	
1847	3,000.00	3,000.00	
1848	4,500.00	4,500.00	
1849	3,500.00	3,500.00	
1850	5,500.00	5,500.00	
1851	5,500.00	5,500.00	
1852	5,000.00	5,000.00	
1853	5,000.00	5,000.00	
1854	10,000.00	10,000.00	
1855	[4] 50,000.00	50,000.00	
1856	30,000.00	30,000.00	
1857	75,000.00	75,000.00	
1858	63,500.00	63,157.25	$342.75
1859	60,000.00	60,000.00	
1860	40,000.00	40,000.00	
1861	60,000.00	60,000.00	
1862	64,000.00	63,704.21	295.79
1863	80,000.00	80,000.00	
1864	199,770.00	189,270.00	10,500.00
1865	112,304.05	112,196.55	107.50
1866	167,787.82	167,787.82	
1867	199,100.00	199,100.00	
1868	279,020.00	277,094.34	1,925.66
1869	172,593.00	172,593.00	
1870	156,440.00	151,596.93	4,843.07
1871	[4] 188,180.00	186,876.81	1,303.19
1872	197,070.00	195,977.25	1,092.75
1873	202,440.00	201,321.22	1,118.78
1874	257,690.00	233,765.78	23,924.22
1875	337,380.00	321,079.83	16,300.17
1876	249,120.00	198,843.64	50,276.36
1877	$194,686.96	$188,206.19	$6,480.77
1878	198,640.00	197,634.94	1,005.06
1879	206,400.00	206,360.00	40.00
1880	199,500.00	198,361.72	1,138.28
1881	275,460.31	267,608.84	[1] 7,851.47
1882	363,011.05	354,482.39	[2] 8,528.66
1883	456,396.11	438,941.72	[3] 17,454.39
1884	[4] 416,641.13	413,618.09	3,023.04
1885	[4] 655,930.25	558,934.89	[5] 96,995.36
1886	[4] 677,973.22	519,196.11	158,777.11
1887	[4] 657,641.81	628,287.14	29,354.67
1888 [6]	1,027,219.06	1,011,282.62	15,936.44
1889	[4] 1,134,480.60	1,033,590.22	[7] 100,890.38
1890	[4] 1,170,139.11	971,823.62	[8] 198,315.49
1891	[4] 1,372,049.21	1,266,277.36	105,771.85
1892	[4] 2,303,655.75	2,253,262.29	50,393.46
1893	2,540,060.72	2,355,430.25	184,630.47
1894	2,603,855.58	1,977,469.28	[9] 626,386.30
1895	[9] 2,506,915.00	2,021,030.38	485,884.62
1896	2,584,013.22	2,094,916.42	489,096.80
1897	2,448,763.53	2,348,512.98	100,250.55
1898	2,467,902.00	2,425,510.44	42,391.56
1899	2,829,702.00	2,827,795.65	28,899.27
1900	3,006,022.00	2,947,603.42	58,418.58
1901	3,304,265.97	3,239,137.39	65,128.58
1902	3,922,780.51	3,902,675.79	20,104.72
1903	5,015,846.00	4,734,230.84	281,615.16
1904	5,025,024.01	4,969,311.64	55,712.37
1905	5,894,540.00	5,820,204.00	74,336.00
1906	6,225,690.00	6,029,510.02	196,179.98
1907	9,505,484.74	9,025,318.93	1,200,165.81
1908	11,487,950.82	11,045,412.19	442,538.63
1909	15,385,806.00	15,079,472.29	306,333.71
1910	15,958,811.27	15,547,983.00	410,828.27
1911 [10]	17,278,976.10	14,759,292.08	2,519,684.02
1912	23,090,842.15	17,772,993.80	5,317,848.35
Total.	[11] 156,996,271.66	[12] 143,308,856.02	[13] 13,493,178.00

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[1] Includes $1,646.45 of the appropriation for reclamation of arid lands, carried to the fiscal year 1882.

[2] Includes $85.26 of the appropriation for reclamation of arid lands and $3,530.85 of the appropriation for experiments in the manufacture of sugar, carried to the fiscal year 1883.

[3] Includes $7,656.13 of the appropriation for reclamation of arid lands, carried to the fiscal year 1884.

[4] Including deficiency appropriation.

[5] Includes $93,192.27 of the appropriation for Bureau of Animal Industry and $2,970.82 of the appropriation for quarantine stations, carried to the fiscal year 1886.

[6] For the fiscal year 1888, including the sum of $8,000 appropriated for deficiencies in the appropriation for experiments in the manufacture of sugar for the fiscal years 1887 and 1888, of which $7,927.50 was disbursed and $72.50 remained unexpended.

[7] Includes $12,923.25 of the appropriation for botanical investigations and $58,364.76 of the appropriation for experiments in the manufacture of sugar, carried to the fiscal year 1890.

[8] Includes $188,974.69 of the appropriation for Bureau of Animal Industry, carried to the fiscal year 1891.

[9] Includes $7,891.94 for statutory salaries of the year 1894.

[10] For the years 1911 and 1912 the figures given represent payments made to close of June 30, 1912, the accounts for those years being still open at the date of this revision.

[11] This total is the amount actually appropriated for the various fiscal years, with the exception of $37,604.70 appropriated July 13, 1868, to cover a number of expenditures made in previous years. It does not include an aggregate sum of $369,344.48 reappropriated from the unexpended balances of several fiscal years. (See foregoing notes.)

[12] Does not include $37,604.70 which was disbursed during several years and covered by an appropriation of like amount made July 13, 1868. (See note [11].)

[13] Does not include an aggregate sum of $369,344.48 reappropriated from the unexpended balances of several fiscal years. (See foregoing notes.)

REPORT OF THE EDITOR.

U. S. Department of Agriculture,
Division of Publications,
Washington, D. C., September 1, 1912.

Sir: I have the honor to submit herewith a report of the operations of the Division of Publications for the fiscal year ended June 30, 1912.

Respectfully,

Jos. A. Arnold,
Editor and Chief.

Hon. James Wilson,
Secretary of Agriculture.

SUMMARY.

The work consisted, as usual, in editing, indexing, illustrating, and distributing the 2,110 different bulletins, circulars, reports, documents, and all kinds of publications of the department, of which 34,678,557 copies were issued. This is an increase of nearly 25 per cent over the number of publications printed and distributed during the preceding year. Of these, 33,888,075 were issued through this division and 790,482 were issued through the Weather Bureau. Of the total number of publications, 24,900,557 were new and 9,778,000 copies were reprints of earlier bulletins and reports. Of publications issued, 10,409,000 were Farmers' Bulletins and 24,269,557 were miscellaneous publications. Of the miscellaneous publications, 22,350,557 were new and 1,919,000 were reprints of earlier publications. Of the Farmers' Bulletins, 2,550,000 were new and 7,859,000 were reprints.

The average number of employees in the division was 197. Of these, 10 were employed in the office of the chief in connection with the administrative work of the division, 12 in the editorial section, 10 in the indexing section, 19 in the drafting and photographic laboratory, and 146 in the document section.

The actual expenditures by the division were as follows:

Printing and binding	$422,981.97
Salaries of employees, all of whom are on the statutory roll	176,889.00
Rents, materials, supplies, etc	27,351.94

The following is a statement of the appropriations expended under the supervision of this division for the fiscal years 1909, 1910, 1911, and 1912:

Appropriations.	1909	1910	1911	1912
Statutory roll of the division	$139,710	$173,450	$172,730	$179,960
General printing fund	435,000	435,000	435,000	423,000
General expenses of the division	40,000	33,000	30,000	30,000
Total	614,710	641,450	637,730	632,960

WORK OF THE YEAR.

The Division of Publications does not originate new work. The Editor supervises the expenditure of the fund for printing and binding, so as to provide for the various bureaus, divisions, and offices such printing and binding as may be required in the prosecution of their work and to secure the publication of the results of their investigations in as attractive form and in as maximum editions as the available appropriation will supply. Even with the most economical administration of the printing fund it was found insufficient to meet the requirements of the department during the year. The economies practiced extended to the condensation of contemplated publications by editorial supervision and review; to improvement in form and style; to the selection and preparation of illustrations, confining them to such as are absolutely necessary; and to the prevention of waste in the vast volume of blanks, blank books, etc.

The appropriation for printing and binding was practically exhausted early in June, in consequence of which a considerable amount of work already ordered could not be completed, and numerous publications containing the results of important investigations had to be held up, to the great inconvenience of the department, as well as to the people, for whom the documents are printed. The policy was adopted of conserving the funds as far as possible for new publications and of ordering reprints only of those for which there was an unusually great and continuous demand.

More publications were sent out upon the orders of Senators, Representatives, and Delegates in Congress during the last year than ever before, as the result of applications made to them by their constituents, showing an increasing use of the department's publications. For the first time in the history of the department every Senator, Representative, and Delegate in Congress utilized in whole or in part his allotment of Farmers' Bulletins.

The demand for published information was greater than ever before, and the number of bulletins, reports, and circulars distributed exceeded that during any previous year. There is apparently no limit to the number of copies of our publications desired by miscellaneous applicants. While more than 34,000,000 were distributed during the year, a much greater number would have been required to supply the demand. The policy has been to supply applicants with the publications, in limited numbers, as long as they were available for distribution; after that to refer them to the superintendent of documents, Government Printing Office, who has them for sale under the law. As it is not likely that a sufficient appropriation will ever be made to print enough publications to supply the demand, it will be necessary to continue that policy.

A considerable increase in the volume of administration blanks, blank books, etc., was required during the year, the expenditure for which was greater than ever before. This is due to the extension of the operations of the department and a necessary incident to its growth.

Another important feature of the year's work was the increasing use of the lists of Farmers' Bulletins by Senators, Representatives, and Delegates in Congress, more than 3,000,000 copies being supplied for that purpose. By this arrangement, applicants select only those publications in which they are interested. While this plan involved additional work in collecting the bulletins for distribution, the result seems to have been satisfactory to Senators and Representatives as well as to their constituents.

There was a great increase in the drafting and photographic work, the volume exceeding that of any previous year.

A marked improvement in punctuality and regularity of attendance on the part of employees was noticeable during the year.

It will be seen that in every section into which the division is divided the results achieved exceeded those of any previous year. That such a vast volume of work was performed was due to the intelligence, industry, and application of the employees who have earned and are justly entitled to the highest commendation.

WEATHER BUREAU PUBLICATIONS.

Of the funds appropriated for the department's printing and binding a specific sum is allotted for the use of the Weather Bureau. These publications do not pass through this division as do other publications of the department. They are printed either at the Weather Bureau or at the Government Printing Office, and are handled and stored at the bureau and distributed therefrom, but a report of the distribution is made to this office.

Ocean and Great Lakes charts.—The bureau has continued the issue of meteorological charts of the oceans and Great Lakes. The charts are 21 by 28 inches in size, are printed in colors, and are published monthly and quarterly, as shown herewith:

Monthly.	Copies.	Quarterly.	Copies.
North Atlantic	6,000	South Atlantic	2,250
North Pacific	3,400	South Pacific	2,250
Indian Ocean	2,250		
Great Lakes	1,200		

Climatological reports.—From the 12 drainage districts of the United States, climatological data are received and distributed monthly, in quarto form, and in number averaging about 1,100 from a district.

Weather maps and bulletins.—Weather Bureau stations in all the States issue a large number of maps, bulletins, and forecast cards. There was a large increase in the number of maps issued—7,528,000 being distributed in 1912.

Sixty-eight stations issue weather maps and bulletins; 30 have printing outfits and the others use duplicating processes. The station map is a sheet 11 by 16 inches, and the subscription price is 20 cents a month or $2 a year. Weather Bureau stations issued forecast cards to the amount of 24,000,000 annually and disseminate local climatological data.

EXPENDITURES FOR PRINTING AND BINDING.

The number of requisitions for printing and binding drawn upon the Government Printing Office was 4,896. The appropriation for printing and binding was $10,000 more than for the preceding year, namely, $470,000. Of this amount $47,000, an increase of $22,000, was expended by the Weather Bureau. Of the remaining $423,000 the expenditures for the various bureaus, divisions, and offices amounted to $300,228.58, being $7,271.47 less than for the year 1911; and $122,753.33 was expended for Farmers' Bulletins, an increase of $4,741.27 by comparison with the preceding year.

A considerable amount of work of all kinds ordered from the Government Printing Office and urgently needed by the department could not be undertaken or completed on account of the exhausted appropriation.

The amount expended from the printing fund for miscellaneous publications and for job printing and binding for the various bureaus, divisions, and offices is given in detail in the following table:

Amounts expended for the various bureaus, divisions, and offices for printing and binding, 1912.

Bureau, division, or office.	Amount.	Bureau, division, or office.	Amount.
Division of Accounts	$5,174.58	Bureau of Soils	$5,740.12
Bureau of Animal Industry	21,966.09	Bureau of Statistics	27,752.15
Bureau of Biological Survey	7,522.75	Miscellaneous	26,186.70
Bureau of Chemistry	12,734.12	Congressional	50,565.18
Bureau of Entomology	15,044.28		
Office of Experiment Stations	30,920.47	Total	300,228.58
Forest Service	13,191.53	Expended for Farmers' Bulletins	122,753.33
Library	12,813.95	Expenditures by Weather Bureau	47,000.00
Bureau of Plant Industry	35,990.86		
Division of Publications	11,426.49	Grand total	469,981.91
Office of Public Roads	5,199.31		

There has been an increase in the expenditures for the publishing of administrative publications issued for the guidance of officers and employees, such as food-inspection decisions, notices of judgment, service announcements, field programs, etc. Through rigid economy the expenses for printing have been kept at the lowest possible point.

Output of publications from the department for the fiscal years 1908, 1909, 1910, 1911, and 1912 compared.

	1908	1909	1910	1911	1912
Number of editions issued	1,522	1,758	1,983	1,953	2,110
Number of copies printed	16,875,515	17,190,345	25,190,469	27,594,811	34,678,557

NUMBER OF PUBLICATIONS ISSUED DURING THE PAST 23 YEARS.

The following statement shows the total number of copies of all publications of the department issued during the last 23 years, aggregating the enormous total of 258,251,024 copies:

Publications of all kinds issued by the department, 1890–1912.

Years.	Number issued.	Years.	Number issued.	Years.	Number issued.	Years.	Number issued.
1890	1,904,300	1897	6,541,210	1904	12,421,386	1911	27,594,877
1891	2,833,933	1898	6,280,365	1905	12,475,157	1912	34,678,557
1892	2,348,797	1899	7,075,975	1906	13,488,527		
1893	3,446,181	1900	7,152,428	1907	16,746,910	Total	258,251,024
1894	3,169,310	1901	7,889,281	1908	16,875,516		
1895	4,100,660	1902	10,586,580	1909	17,190,345		
1896	6,561,700	1903	11,698,564	1910	25,190,465		

SALE OF THE DEPARTMENT'S PUBLICATIONS.

The superintendent of documents of the Government Printing Office sold 171,866 copies of this department's publications during the fiscal year, for which he received $16,428.07.

The sales of the department's publications within the last seven years is shown in the following table:

Sales of agricultural publications by the Superintendent of Documents during the fiscal years 1906–1912.

Years.	Number of copies.	Amount received.	Years.	Number of copies.	Amount received.
1906	47,745	$5,388.28	1910	147,327	$18,398.18
1907	71,764	10,885.20	1911	183,577	18,657.17
1908	94,926	14,174.22	1912	171,866	16,428.07

It will be observed that the number of copies sold during this fiscal year was about 7 per cent less than the number sold in 1911.

AUTHORITY TO REPRINT.

Under the operation of a provision of the law, the superintendent of documents can reprint and sell any publication, so long as there is a demand for it, thus enabling his office to operate on a strictly business basis, paying for the reprints out of the receipts from previous sales, and making no drafts on the department's printing fund. Under this law applicants desiring or needing publications of the department can secure the same when the department's limited editions are exhausted and it is not possible for it to order additional copies.

Classes of agricultural publications reissued by the superintendent of documents during the fiscal year 1911–12.

Class of publication.	Number.	Copies.
Reports	5	1,300
Bulletins	178	47,250
Circulars	138	26,050
Unnumbered publications	30	11,900
Experiment Station Record	7	350
Farmers' Bulletins	182	33,600
Total	540	120,450

The following table shows the agricultural publications reissued by the superintendent of documents, classified according to the main branch of the department which originally contributed them:

Agricultural publications reissued by the superintendent of documents during the fiscal year 1912, classified according to the bureau or office originally contributing them.

Bureau or office.	Number.	Copies.
Office of the Secretary	11	1,700
Bureau of Animal Industry	72	15,100
Biological Survey	28	10,200
Bureau of Chemistry	52	12,650
Bureau of Entomology	61	10,350
Office of Experiment Stations	101	27,700
Forest Service	44	8,150
Bureau of Plant Industry	109	21,000
Office of Public Roads	13	5,150
Division of Publications	6	1,200
Bureau of Soils	35	4,150
Bureau of Statistics	2	200
Weather Bureau	6	2,900
Total	540	120,450

Under the law of January 12, 1895, all remittances for publications should be forwarded to the superintendent of documents, Government Printing Office. By instructions conspicuously printed at the head of the Monthly List of Publications correspondents are advised to apply to that official when they desire to obtain any publications after they have been advised that the department's supply is exhausted. Notwithstanding every effort to prevent it, money in payment for publications continues to come to this division, the amount received during the fiscal year being $2,248.33, an increase of $450.46, all of which was forwarded to the superintendent of documents by registered mail. A careful record of all amounts so received and forwarded was kept in the division.

FARMERS' BULLETINS.

It is now 23 years since the first Farmers' Bulletin was issued, and the enormous growth of the series has demonstrated the need of brief, inexpensive publications, which convey useful information to practical people in plain every-day English. At first the growth was comparatively slow; but at this time the number has reached 500, and the total output is over 98,000,000.

The growth of the popularity of this series of bulletins is not more clearly illustrated by the total number distributed than by the fact that the annual distribution has been increased from 150,000 in 1890 to nearly 11,000,000 in 1912 with an unsatisfied demand for at least 5,000,000 more copies than the funds at the department's disposal could supply. Schools of all grades and institutions of higher education are using them in connection with their courses of instruction—a use that it is extremely desirable to encourage by a generous response to the increasingly large demand.

The following table shows the output of Farmers' Bulletins during the past six years and the expenditures therefor:

Output of Farmers' Bulletins and the cost for the fiscal years 1907, 1908, 1909, 1910, 1911, and 1912.

Fiscal year.	Fund drawn upon.	Number issued.	Number of copies.	Cost.
1907	Farmers' Bulletin fund	235	6,469,000	$98,601.17
1908	....do	252	6,574,500	98,601.49
1909	....do	271	7,755,000	122,475.48
1910	....do	299	9,337,500	126,579.37
1911	....do	295	9,219,000	118,012.06
1912	....do	344	10,409,000	122,753.33

CONGRESSIONAL DISTRIBUTION.

These bulletins are distributed jointly by the department and Members of the two Houses of Congress, and the following table shows the entire number distributed during the past 23 years and the number distributed annually by Senators, Representatives, and Delegates and the department:

Growth of the Farmers' Bulletin series during 23 years, with congressional distribution.

Year.	New bulletins issued.	Copies issued.	Copies distributed by Congressmen.	Year.	New bulletins issued.	Copies issued.	Copies distributed by Congressmen.
1890-1893	14	540,000		1904	25	6,435,000	4,895,556
1894	5	278,500		1905	24	5,925,500	4,782,643
1895	11	1,567,000	885,770	1906	33	6,568,000	5,279,476
1896	13	1,891,000	1,316,695	1907	42	6,469,000	3,484,713
1897	16	2,387,000	1,967,237	1908	26	6,574,500	3,928,437
1898	21	2,170,000	1,580,065	1909	34	7,755,000	3,960,642
1899	22	2,437,000	1,101,985	1910	45	9,337,500	6,449,589
1900	18	2,360,000	1,666,909	1911	48	9,219,000	5,474,079
1901	14	3,345,000	2,195,010	1912	44	10,409,000	7,351,262
1902	23	6,150,000	4,289,126				
1903	22	6,602,000	3,954,976	Total	500	98,410,000	64,564,170

The following table shows the number, title, and the number of copies printed of each new Farmers' Bulletin issued during the year:

New Farmers' Bulletins issued during the fiscal year ended June 30, 1912.

Bulletin No.	Title of bulletin.	Total number of copies.
457	Experiment Station Work-LXIV	40,000
458	The Best Two Sweet Sorghums for Forage	40,000
459	House Flies	130,000
460	Frames as a Factor in Truck Growing	45,000
461	The Use of Concrete on the Farm	165,000
462	The Utilization of Logged-off Land for Pasture in Western Oregon and Western Washington	30,000
463	The Sanitary Privy	251,000
464	The Eradication of Quack-grass	30,000
465	Experiment Station Work-LXV	30,000
466	Winter Emmer	40,000
467	The Control of the Chestnut-bark Disease	125,000
468	Forestry in Nature Study	75,000
469	Experiment Station Work-LXVI	30,000
470	Game Laws for 1911	75,000
471	Grape Propagation, Pruning, and Training	65,000
472	Systems of Farming in Central New Jersey	50,000
473	Tuberculosis	110,000
474	Use of Paint on the Farm	60,000
475	Ice Houses	50,000

New Farmers' Bulletins issued during the fiscal year ended June 30, 1912—Continued.

Bulletin No.	Title of bulletin.	Total number of copies.
476	The Dying of Pine in the Southern States: Cause, Extent, and Remedy	30,000
477	Sorghum Sirup Manufacture	30,000
478	How to Prevent Typhoid Fever	130,000
479	Experiment Station Work–LXVII	30,000
480	Practical Methods of Disinfecting Stables	50,000
481	Concrete Construction on the Live-stock Farm	90,000
482	The Pear and How to Grow It	50,000
483	The Thornless Prickly Pears	25,000
484	Some Common Mammals of Western Montana in Relation to Agriculture and Spotted Fever	30,000
485	Sweet Clover	50,000
486	Experiment Station Work–LXVIII	30,000
487	Cheese and Its Economical Uses in the Diet	179,000
488	Diseases of Cabbage and Related Crops and Their Control	30,000
489	Two Dangerous Imported Plant Diseases	15,000
490	Bacteria in Milk	30,000
491	The Profitable Management of the Small Apple Orchard on the General Farm	50,000
492	The More Important Insect and Fungous Enemies of the Fruit and Foliage of the Apple	30,000
493	The English Sparrow as a Pest	30,000
494	Lawns and Lawn Soils	20,000
495	Alfalfa Seed Production	20,000
496	Raising Belgian Hares and Other Rabbits	30,000
497	Some Common Game, Aquatic, and Rapacious Birds in Relation to Man	20,000
498	Methods of Exterminating the Texas-Fever Tick	30,000
499	Experiment Station Work–LXIX	30,000
500	The Control of the Boll Weevil	30,000
	Total	2,550,000

The appropriation for Farmers' Bulletins is carried in the appropriation for printing for the Department of Agriculture under the heading "Government Printing Office" in the act making appropriations for sundry civil expenses of the Government, that for the fiscal year ending June 30, 1912, occurring on page 95, Public No. 525, approved March 4, 1911, being $125,000.

With the present appropriation it is possible to make an allotment to each Senator, Representative, and Delegate of approximately 12,500 copies, which is admittedly insufficient in view of the increasing requests received by them, with many of which they are unable to comply. Under the law only one-fifth of the Farmers' Bulletins printed are available for distribution by the department, and this is not sufficient to permit it to comply with half of the requests it receives and makes it necessary to constantly refer applicants to their Senators, Representatives, or Delegates, who themselves in many instances are unable to supply the bulletins.

It is obviously desirable that the congressional and the department allotments be increased, and it should be borne in mind that the appropriation for printing Farmers' Bulletins has not been increased for five years, during which time the popular demand for them has more than doubled, due to the fact that the people all over the country have learned not only through the press, but from the lists which are sent out by Senators, Representatives, and Delegates, as well as by the department, the value of these pamphlets. The demand comes from all sections and from all classes, as the 500 different bulletins cover a great variety of subjects, among which are some sure to be interesting to every one. There is now a great demand from schools in which agriculture is now being taught, and from corn clubs and associations of all kinds, which was not originally contemplated, but which should be supplied and can not be, without an increase in the fund for printing.

The Sixty-third Congress will have 535 Senators, Representatives, and Delegates, or 10 per cent more than the present appropriation is intended to serve. Therefore an increase of at least $12,500 would be necessary to keep the allotment at its present rate—12,500 copies; but if the allotment to each Senator, Representative, and Delegate is to be increased to 20,000 (an increase somewhat over 60 per cent) it would be necessary to have an additional increase of about 60 per cent, or an additional $82,500, making the appropriation for Farmers' Bulletins $220,000 and the entire appropriation for printing $690,000. Unless provison be made for them, the additional Members coming in on March 4, 1913, will not have any Farmers' Bulletins to their credit until July 1 of that year, and then the quota of all will have to be reduced 10 per cent to provide for them.

Some of the Senators, Representatives, and Delegates do not distribute all their allotments, but under the law the bulletins must be held subject to their order. This limits the department's ability to extend aid by assigning an additional allotment to those needing more than their quota. If, however, a clause stating that "the undrawn balance of each Senator, Representative, Delegate, and Resident Commissioner shall lapse on April 30," be inserted in the appropriation act, as was the case when the agricultural appropriation bill carried the item for printing Farmers' Bulletins, then there need be no accumulation carried over and the department would have a supply from which extra quotas could be taken for those needing them.

DEPARTMENTAL ORDERS.

The only order issued affecting the work of this division during the year was General Order No. 146, dated August 23, 1911, reprinted below:

Distribution of Publications.

To promote a careful distribution of publications and to prevent waste and duplication, it is hereby ordered that the following rules be rigidly observed:

(A) DISTRIBUTION IN THE UNITED STATES, CANADA, CUBA, AND MEXICO.

1. In the distribution of the regular publications of the various bureaus, divisions, and offices, preference shall be given to libraries, educational and scientific institutions, the press, State and foreign officials connected with agriculture, exchanges, and the bureau and divisional lists comprising such persons as are rendering tangible service to the department either by active cooperation or as special correspondents, or those particularly interested in the work. Miscellaneous applicants will be supplied as long as the demand continues and funds for printing will permit. After that applicants will be referred to the superintendent of documents, of whom the publications can be obtained at a nominal charge under the law. This does not apply to Farmers' Bulletins, emergency circulars, or circulars of general interest which are issued in large editions and are distributed to the regular mailing lists and to miscellaneous applicants. All publications shall be distributed by the Division of Publications in accordance with the law of January 12, 1895. The mailing lists of all bureaus, divisions, and offices shall be kept in the Division of Publications, where the addressing of the franks or envelopes for the mailing of publications shall be done.

2. The Office of Experiment Stations shall have charge of the list of the libraries of the State agricultural colleges and experiment stations. The librarian of the department shall have charge of the list of other libraries and institutions which receive all the publications of the department.

3. To prevent duplication, the bureaus and divisions shall file in the library of the department lists of libraries and other institutions to which their publications are regularly sent. The librarian shall be notified of all changes in and additions to these lists.

4. All letters received by a bureau or division which are simply requests for publications shall be referred to the Division of Publications for attention and reply.

(B) DISTRIBUTION OF DEPARTMENT PUBLICATIONS TO FOREIGN COUNTRIES EXCLUSIVE OF CANADA, CUBA, AND MEXICO.

1. The distribution of publications to foreign countries shall be confined to libraries, educational and scientific institutions, the press, State and foreign officials connected with agriculture, exchanges, and such persons as are rendering tangible service to the department, either by active cooperation in its work or as special correspondents.

2. The librarian of the department shall have charge of the list of foreign libraries and institutions ("Libraries list") which receive all the publications of the department, and also the lists of libraries and institutions which receive regularly the yearbooks and farmers' bulletins. In addition, the library shall maintain an "exchange list" to which shall be sent regularly the Monthly List of Publications of the department. This list shall be confined to libraries, institutions, and individuals privileged to receive miscellaneous publications free on request, in accordance with the provisions of section B, paragraph 1.

3. The bureaus, divisions, and offices may have mailing lists for their respective publications. No list shall, however, exceed 200, with the exception of the list for the Experiment Station Record. Bureaus, divisions, and offices having foreign mailing lists shall file copies of them with the librarian of the department, who shall be notified of all changes in and additions to the lists. Requests for the sending of publications to their lists from the various bureaus, divisions, and offices shall be sent by them to the librarian of the department, who will authorize the sending of the publications by the Division of Publications. For the purpose of preventing duplication and for use in obtaining exchanges, the librarian shall maintain a consolidated list of all the addresses appearing on the foreign mailing lists of the department.

4. The number of individuals appearing on the foreign mailing list of any bureau, division, or office shall not exceed 10 per cent of the total number of addresses appearing on the list.

5. No general consular list shall be maintained. Any consular distribution desired must be on a list especially prepared for each publication and must be approved by the Secretary.

6. Miscellaneous foreign requests, including requests for publications selected from the Monthly List, shall be referred to the librarian of the department, who, in acting upon the requests, shall be governed as to the free distribution by the provisions of section B, paragraph 1. Requests from applicants not entitled to the publications free of charge shall be referred by the librarian to the Division of Publications, which office shall inform the applicants in regard to the possibility of obtaining the publications by purchase from the superintendent of documents.

7. Miscellaneous foreign requests addressed to the bureaus and divisions may be referred to the library if the bureaus and divisions have no special interest in granting the request, or may be acted upon by them in accordance with the provisions of section B, paragraph 1. The number of publications which each bureau, division, and office may send to foreign countries, in addition to those sent (as issued) to the mailing lists, shall be limited as follows:

	Number per month.
Bureau of Animal Industry	75
Bureau of Biological Survey	15
Bureau of Chemistry	75
Bureau of Entomology	75
Office of Experiment Stations	75
Forest Service	125
Library (for library publications)	10
Bureau of Plant Industry	75
Office of Public Roads	30
Division of Publications	10
Bureau of Soils	75
Bureau of Statistics	75
Total	715

The chief of the Division of Publications is authorized to honor requests of this character to the extent set forth above. Any unused credit in one month may be carried over and used in the succeeding month. In order to simplify the records, the "authorization slips" will no longer be required. The miscellaneous orders on the Division of Publications for the sending of publications shall be made out in duplicate and both copies sent direct to the chief of that division. The Division of Publications shall keep a record of the original order of the number of publications sent, the date forwarded, and the postage required, and shall return the duplicate (carbon) copy with the same information to the bureau or office which ordered the publications. In case the publications are furnished by the bureaus, etc., the method of procedure shall be the same, except that the order shall state that the publications accompanied it. Further information as to the details will be furnished by the librarian of the department, who will also provide the necessary blanks.

(C) REVISION OF MAILING LISTS.

All mailing lists maintained at present by the bureaus and divisions should be revised in accordance with the above regulations and revised copies furnished to the librarian of the department at the earliest practicable date. Lists shall hereafter be revised at least once in two years.

(D) EXCHANGES.

All exchanges received in return for department publications shall be sent to the library. When arranging exchanges with institutions, societies, and journals, the bureaus and divisions shall request that the exchanges be addressed to the library of the department, unless the library is already receiving a sufficient number of copies.

This order supersedes General Orders, Nos. 64, 66, and 96, and supplements in detail the recommendations in regard to publications in the Report of the Department Committee on Efficiency and Economy.

JAMES WILSON, *Secretary.*

The conditions governing the distribution of publications contained in this order were carefully observed.

EDITING.

The most noteworthy change in the personnel during the year was the retirement of Mr. George Wm. Hill, who resigned the middle of September, 1911. The numerical strength of the section was maintained by the transfer of Mr. R. S. Moore from the Bureau of Plant Industry.

The general order of June 21, 1911, that all proofreading and revising, except such as is done by the author, be done in the Division of Publications, has not required any increase in the number of editors. Its more general observance by the various bureaus would expedite the work and reduce the cost.

The editing of all the bulletins issued by various bureaus of the department and conferences with the different chiefs and authors entailed in the performance of this duty consume much time, but are necessary to enable the chief to properly advise the Secretary as to what is being published, and to judiciously expend the general printing fund.

The editors relieve both the Secretary and the bureau chiefs of much attention to details, and, because of the centralization of the work, necessarily secure better and more economical results than would be otherwise accomplished.

There could be no better statement of the efficiency of this office than that afforded by the following table, which shows that with an increase of over 200 per cent in the number of new publications, only three additional editors have been provided in the past 10 years.

Year.	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912
New publications...	375	379	391	414	521	447	650	1,085	[1] 1,170	[1] 1,250
Reprints............	482	514	596	654	819	998	485	462	696	648
Total..........	857	893	987	1,068	1,330	1,448	1,135	1,547	1,866	1,888

[1] Not including press notices which were mimeographed.

The editor and assistant chief of the division and seven assistant editors comprise the staff. The editing of 100,000 pages of manuscript, criticism of 5,000 illustrations, proofreading of 10,000 galleys, and reading and correcting 28,187 first and second page proofs, the handling of many thousand pieces of job work for the department's forms, blanks, and numerous circular letters, orders, etc., is a large undertaking. In addition to all this, a large volume of miscellaneous work has passed through the division. All has been promptly and efficiently performed, and the work has been kept up to date.

The cost of printing the department's documents has reached such large figures, and even yet not large enough to permit of printing copies to supply the demand, that every means possible is adopted to secure the greatest volume of printing with the funds appropriated, and to this end nothing is more effective than the work of the editors in examining the manuscripts, condensing statements, eliminating redundancies, reducing the number of illustrations, and in fixing the form, size, and style of the finished publication. The work is facilitated and made more effective by the cordial assistance offered by the various bureaus, divisions, and offices with whom frequent conferences are held during the progress of the work.

The expense incurred as the result of alterations in the proof during the year aggregated $7,395.70. This amount is much smaller than ever before, but it could and should be still further reduced. Practically no alterations would be necessary if more accurate copy were submitted. The cost of "rush" work, that is to say, printing upon which 20 per cent extra was authorized in order to insure immediate delivery, amounted to $1,077.06. A considerable amount of this could be saved if blanks were ordered before the supply is exhausted.

During the year the policy was inaugurated of printing full-page plate illustrations on both sides of the paper. This results in reducing the size and weight of the bulletin, and effects a considerable saving in the printing without detracting from the quality of the work. This course was pursued with regard to the Yearbook, with a saving of about $8,000.

The following tables, presenting a complete statement of the publications issued by the department, will, by the great bulk of printed matter shown, give a good idea of the large amount of work demanded of the division's force.

SUMMARY OF PUBLICATIONS PRINTED.

Publications issued by the department during the fiscal year 1912, classified according to the bureau, division, or office contributing them.

FARMERS' BULLETINS.

Bureau, division, or office contributing publications.	New.				Earlier issues reprinted.				Total.			
	Number.	Pages.	Illustrations.	Copies.	Number.	Pages.	Illustrations.	Copies.	Number.	Pages.	Illustrations.	Copies.
Bureau of Animal Industry	4	94	50	345,000	30	903	286	1,349,000	34	1,087	336	1,694,000
Biological Survey	5	168	70	185,000	11	296	84	165,000	16	462	154	350,000
Bureau of Chemistry	2	62	23	90,000	8	183	45	240,000	10	245	68	330,000
Bureau of Entomology	4	66	33	190,000	16	482	102	325,000	20	548	135	515,000
Office of Experiment Stations	8	227	39	545,000	99	3,143	404	2,295,000	107	3,370	443	2,840,000
Forest Service					7	248	115	125,000	7	248	115	125,000
Bureau of Plant Industry	17	484	182	630,000	101	2,738	927	2,935,000	118	3,222	1,109	3,565,000
Division of Publications	2	40	9	395,000	4	142	59	120,000	6	182	68	515,000
Office of Public Roads	1	23	10	150,000	5	143	29	175,000	6	166	39	325,000
Bureau of Soils	1	28	19	20,000	6	159	18	105,000	7	187	37	125,000
Weather Bureau					2	55	7	25,000	2	55	7	25,000
Total	44	1,192	435	2,550,000	289	8,580	2,076	7,859,000	333	9,772	2,511	10,409,000

ALL PUBLICATIONS EXCEPT FARMERS' BULLETINS.

Bureau, division, or office contributing publications.	New.				Earlier issues reprinted.				Total.			
	Number.	Pages.	Illustrations.	Copies.	Number.	Pages.	Illustrations.	Copies.	Number.	Pages.	Illustrations.	Copies.
Secretary's office:												
Congressional	68	8,706	626	811,975					68	8,706	626	811,975
Departmental	562	2,142	25	8,212,500	42	119		40,000	604	2,261	25	8,252,500
Division of Accounts	1	62		300					1	62		300
Bureau of Animal Industry	79	660	131	453,500	51	1,449	84	130,500	130	2,109	215	584,000
Biological Survey	20	504	178	81,500	20	965	150	34,000	40	1,469	328	115,500
Bureau of Chemistry	49	1,189	42	140,800	24	1,985	45	44,000	73	3,174	87	184,800
Bureau of Entomology	53	2,183	663	142,500	69	2,489	881	122,000	122	4,672	1,544	264,500
Office of Experiment Stations	77	4,151	193	372,500	44	3,292	195	89,500	121	7,443	388	462,000
Forest Service	58	1,390	259	516,000	23	1,191	150	46,500	81	2,581	409	562,500
Library	13	469		13,000					13	469		13,000
Bureau of Plant Industry	73	2,673	453	1,799,000	40	1,335	234	1,081,000	113	4,008	687	2,880,000
Division of Publications	32	230		6,339,500	13	139		283,000	45	369		6,622,500
Office of Public Roads	13	382	108	96,000	6	121	6	10,000	19	503	114	106,000
Bureau of Soils	50	956	35	127,000	18	1,138	50	18,500	68	2,094	85	145,500
Bureau of Statistics	60	1,298	65	2,494,000	1	67	86	5,000	61	1,365	151	2,499,000
Weather Bureau	210	4,655	305	750,482	8	309	20	15,000	218	4,964	325	765,482
Total	1,418	31,650	3,083	22,350,557	359	14,599	1,901	1,919,000	1,777	46,249	4,984	24,269,557

Publications issued by the department during the fiscal year 1912, classified according to the bureau, division, or office contributing them—Continued.

ALL PUBLICATIONS, INCLUDING FARMERS' BULLETINS.

Bureau, division, or office contributing publications.	New.				Earlier issues reprinted.				Total.			
	Number.	Pages.	Illustrations.	Copies.	Number.	Pages.	Illustrations.	Copies.	Number.	Pages.	Illustrations.	Copies.
Secretary's office:												
Congressional	68	8,706	626	811,975					68	8,706	626	811,975
Departmental	562	2,142	25	8,212,500	42	119		40,000	604	2,261	25	8,252,500
Division of Accounts	1	62		300					1	62		300
Bureau of Animal Industry	83	754	181	798,500	81	2,442	370	1,479,500	164	3,196	551	2,278,000
Biological Survey	25	672	248	266,500	31	1,259	234	199,000	56	1,931	482	465,500
Bureau of Chemistry	51	1,251	65	230,800	32	2,168	90	284,000	83	3,419	155	514,800
Bureau of Entomology	57	2,249	696	332,500	85	2,971	983	447,000	142	5,220	1,679	779,500
Office of Experiment Stations	85	4,378	232	917,500	143	6,435	599	2,384,500	228	10,813	831	3,302,000
Forest Service	58	1,390	259	516,000	30	1,439	265	171,500	88	2,829	524	687,500
Library	13	469		13,000					13	469		13,000
Bureau of Plant Industry	90	3,157	635	2,429,000	141	4,073	1,161	4,016,000	231	7,230	1,796	6,445,000
Division of Publications	34	270	9	6,734,500	17	281	59	403,000	51	551	68	7,137,500
Office of Public Roads	14	405	118	246,000	11	264	35	185,000	25	669	153	431,000
Bureau of Soils	51	984	54	147,000	24	1,297	68	123,500	75	2,281	122	270,500
Bureau of Statistics	60	1,298	65	2,494,000	1	67	86	5,000	61	1,365	151	2,499,000
Weather Bureau	210	4,655	305	750,482	10	364	27	40,000	220	5,019	332	790,482
Total	1,462	32,842	3,518	24,900,557	648	23,179	3,977	9,778,000	2,110	56,021	7,495	34,678,557

INDEXING.

The most encouraging feature of the index work during the past year has been an increase in the demand for information only to be obtained from the two indexes maintained here. The growth of interest in this work has gone forward steadily in proportion as the existence of the indexes has become known to the other divisions of this department and to persons outside who are interested in agriculture. It has seemed very difficult to gain the attention of those who would naturally be expected to use this means of saving labor in the investigation of agricultural subjects, but as fast as persons really become acquainted with the indexes they make use of them. It is only a question of time in the development of better methods of research when every investigator must depend upon indexes such as these for the rapid prosecution of his work.

During the past year it has been possible to maintain the index for books available for distribution and make it steadily useful by sending our publications to persons asking for a general line of information, and by referring them to books of the desired kind in the hands of the superintendent of documents for sale.

For the two indexes during the year the total number of cards written was 62,584, and the letters to applicants for general information in the agricultural field, nearly all of which have been answered by use of the two indexes, have numbered 6,411.

The work on books indexed this year has been very much the same as heretofore. Indexes have been made as required of the Yearbook, of the annual reports, and of various other publications, including indexes for three volumes of Farmers' Bulletins of twenty-five each.

The order of June 21, 1911, under which the indexing for the several bureaus and divisions of the department was to have been done here has been practically ineffective. Differences between this division and other branches of the service as to how an index should be made have developed and the result has been that the indexing for most of the bureaus has continued within their own offices.

In addition to the work that recurs from year to year there have been two important features: The compilation of a supplement of Bulletin 6, of this division, which shall represent all the publications of the department from the year 1902, up to which date the books in Bulletin 6 reach, to whatever period may be determined upon as most satisfactory for the limit in this proposed supplement. There is now maintained a card list of titles which fills up the gap since the close of the work on Bulletin 6, but the details of information supplied by this list are not so complete, and the general public, of course, can not make use of such a card list at all; so that the issuance of the supplement will be of benefit to all inquirers in this field. Another unusual piece of work is the compilation of the five-year index for the Yearbooks. This is nearing completion.

The care of the complete sets of books for the vault has occupied considerable time during the year. The unsatisfactory storage of this vault set and the possibility of valuable books being lost still continues.

As heretofore, considerable work in examining papers for the Civil Service Commission was done.

The reading of the Congressional Record and the supplying of public documents to other branches of the department have been continued, and the demand for help of this kind from all directions has grown notably. It has been possible to supply many publications not strictly called for under the limitations of the work, and an effort has been made to furnish copies of available books likely to be needed for reference in the future to the general library of the department and to the bureau libraries.

Under the present system, by careful watching, most of the documents of interest to persons in the department can be secured; yet it is frequently impossible to foresee that a certain document is likely to be wanted by several officials, bureaus, or divisions of this department, as is sometimes the case. When the calls come in it is too late to get publications from the printer, and frequently too late to obtain any copies at the Capitol document rooms. It would be much better if an arrangement could be made by which the Public Printer would send to this office four copies of these documents along with the bills, reports, etc. After they were examined here, if it was deemed unlikely that they would be needed, they could be returned to the Government Printing Office. In this way few documents that could be wanted here could be missed.

The fact that the office is overcrowded is too well known to require comment. The health inspector from the Marine-Hospital Service, who came in soon after the close of the period for which this report is made, called attention to this condition immediately after he came into the room and some relief can not long be deferred.

ILLUSTRATING.

During the year 1,784 drawings were prepared by the three draftsmen, as compared with 1,566 in 1911 and 1,460 in 1910. This increase of output was not because the drawings were either small or simple. On the contrary, many of them were both large and intricate, taxing the energy and industry of the men to the utmost.

The following table shows the number of drawings made for each independent office of the department:

Number of drawings made during fiscal year 1911–1912.

Office of Secretary	107
Bureau of Plant Industry	521
Bureau of Animal Industry	153
Bureau of Chemistry	106
Bureau of Biological Survey	38
Bureau of Statistics	459
Bureau of Soils	54
Bureau of Entomology	97
Office of Experiment Stations	83
Division of Accounts	109
Division of Publications	6
Office of Public Roads	15
Total	1,784

The total output of the photographic laboratory was 89,881 pieces, but these figures only suggest the amount of labor and skill necessary to produce such technically and artistically correct illustrations as are demanded by the department's publications.

The office is handicapped because of the lack of proper ventilating and cooling facilities in the dark rooms. Although the work of this office is primarily intended for the publications of the department, there are also constant demands for photographic prints and lantern slides of these illustrations for use by both the officials of the department and other scientific investigators, who pay the expenses of reproduction.

The difficulties experienced during the past year in the effort to locate the originals or negatives which have been retained by the authors or filed in the different offices emphasize the necessity of filing all the negatives and original drawings of the illustrations appearing in the department's publications in the illustrating section of the Division of Publications, as directed in your order of June 21, 1911.

The following table summarizes the work done in the photographic laboratory during the past 12 months:

Summary of photographic work done during the fiscal year ended June 30, 1912.

Contact prints, developing paper	50,840
Negatives made	3,392
Negatives, wet plates	109
Lantern slides	5,186
Lantern slides, colored	644
Plates and films developed	4,732
Bromide enlargements	1,635
Bromide enlargements mounted	801
Mounted, dry tissue	10,614
Solar bromide prints	1,703
Blue prints	10,133
Reproducing prints	92
Total	89,881

One hundred and ninety-five requests for photographs, lantern slides, etc., costing $531.23, were complied with, and $522.19 was collected and turned over to the disbursing office. Nine dollars and four cents is still unpaid. In addition to this service to the public, a large number of cuts from which illustrations appearing during this or previous years in the department's publications had been printed were taken from the files and sent to electrotypers, who furnished duplicates to the applicants at their expense, these cuts being afterwards returned to the files.

The following table gives a detailed statement of this part of the division's activities:

Bureau, division, or office.	Contact prints.	Negatives made.	Lantern slides.	Bromide enlargements.	Solar bromides.	Blue prints.	Plates and films developed.	Mounted—dry tissue.	Negatives made—wet plates.	Bromide enlargements—mounted.	Reproduction prints.
Office of Secretary	1,597	44									
Assistant Secretary	230	11	50	4	19				2		
Chief Clerk	210	105	8	3							
Office of Solicitor				10							
Chief Engineer	36				147	31	17				
Division of Accounts					31						
Bureau of Animal Industry	5,951	634	362	454	58	5,805	702	1,426	40	347	
Biological Survey			29								
Bureau of Chemistry	1,804	306	415	47	3	338	333			13	
Bureau of Entomology	3,600	288	311	23	12	10	308	272			
Office of Experiment Stations	1,731	202	1,068	3	824	2,401	287		40		
Library	108										
Division of Publications	2,226	113		3	207	10		8,160	17		92
Bureau of Plant Industry	31,356	1,680	2,066	1,068	362	586	2,971	756	7	441	
Office of Public Roads		1			26	952					
Bureau of Soils	258				14		114		3		
Bureau of Statistics	60	8		3							
Paid Orders	1,673		1,021	17							

DISTRIBUTION OF PUBLICATIONS.

During the year 33,888,075 publications were received from the Public Printer, making the total number available for distribution 38,510,460, of which 33,243,761 copies were distributed, leaving a balance on hand June 30, 1912, of 5,266,699 documents. Of the total number distributed 19,764,792 were miscellaneous publications, and 10,207,969 were Farmers' Bulletins and 3,271,000 lists of available Farmers' Bulletins.

The total number of Farmers' Bulletins available for distribution during the year was 13,393,882. Of this number 7,351,262 were distributed upon orders of Senators, Representatives, and Delegates in Congress, and 2,856,707 were sent out upon requests of miscellaneous applicants, leaving a balance on hand at the close of June 30, 1912, of 3,185,913 copies. The increase in the congressional distribution of this class of publications during the fiscal year just ended over that of the previous year was 1,877,183. The total number of these bulletins sent upon requests of miscellaneous applicants was 193,930 less than the number distributed to this class of applicants during the year ending June 30, 1911. During the past two years the number of Farmers' Bulletins sent by the department to miscellaneous applicants has been restricted to approximately 10 numbers, as they have been advised that publications could be procured by addressing their Senators or Representatives in Congress. This has tended in a great measure to divert the demand toward these officials, as is shown by the fact that there was an increase of about 30 per cent in the congressional distribution.

Although the total distribution is nearly 10 per cent larger than of the previous year, this increase does not fully show the extra amount of work involved, inasmuch as under the present practice Senators and Representatives in Congress, by sending the list of Farmers' Bulletins to individuals in their districts and allowing the people to make their own selection, have increased the number of individual orders that require separate and distinct handling and assembling by 300 per cent. This work was so great during the past season that for two months those engaged in this work were required to work an extra half hour daily in order to cope with it.

Probably the most important feature of the work done in the Document Section is the handling of the great mass of correspondence received from miscellaneous applicants in all parts of the country In a great many cases the applicant requests information that is not contained in the publications, necessitating the reference of the request to other offices or the writing of explanatory letters. During the year 742,200 of these communications were received, involving 768,312 orders on the mailing rooms. Thirty-one thousand two hundred form cards and circular letters were used in reply, in addition to the 68,172 specially prepared replies, and in the great majority of cases the request of the correspondent was complied with by sending the publications without other response.

The work devolving upon the force required considerable judgment, a fine knowledge of the publications of the department, as well as rapid and legible penmanship.

During the year ending June 30, 1912, there were sent to foreign addresses 42,325 packages containing publications of this department, weighing in the aggregate 17,323.2 pounds and requiring postage amounting to $1,385.86. Furthermore, 16,396 packages, weighing 9,368 pounds, were shipped through the Smithsonian Institution, at a cost of $468.40. The matter sent through the Smithsonian Exchange exceeds by 10,174 packages and 6,876 pounds like matter sent the year previous. This increase in the number of packages sent through the Smithsonian Exchange was, of course, accompanied by a decrease in the amount spent for postage, amounting to $566.19. A detailed report showing the number of packages and pounds ordered sent by the various bureaus, offices, and divisions of the department is appended hereto:

Summary for report of foreign mail for the year ending June 30, 1912.

Division.	Packages requiring postage.			Sent through Smithsonian.		Total.	
	Number.	Weight.	Postage.	Number.	Weight.	Number.	Weight.
		Pounds.			*Pounds.*		*Pounds.*
Department Library	17,194	6,193.1	495.45	1,579	1,139	18,773	7,332.1
Office of Experiment Stations	7,119	4,786.0	382.88	4,283	3,025	11,402	7,811.0
Bureau of Chemistry	3,010	909.7	72.78	2,427	963	5,437	1,872.7
Bureau of Animal Industry	2,741	1,348.9	107.91	2,328	1,374	5,069	2,722.9
Bureau of Entomology	3,065	1,039.9	83.19	1,963	806	5,028	1,845.9
Bureau of Statistics	3,371	650.4	52.03	295	121	3,666	771.4
Bureau of Plant Industry	1,760	869.1	69.53	906	462	2,666	1,331.1
Forest Service	1,417	505.4	40.43	869	432	2,286	937.4
Bureau of Soils	692	212.1	16.97	468	268	1,660	480.1
Biological Survey	635	358.7	28.70	462	289	1,097	647.7
Irrigation and Forestry Board	362	45.3	3.62	335	127	697	172.3
Division of Publications	533	98.6	7.89	79	48	612	146.6
Office of Secretary	245	239.4	19.15	259	265	504	504.4
Office of Public Roads	181	66.6	5.33	143	49	324	115.6
Total	42,325	17,323.2	1,385.86	16,396	9,368	58,721	26,691.2
Total for fiscal year 1911	61,896	24,400.2	1,952.05	6,222	2,492	68,118	26,892.2
Total for fiscal year 1912	42,325	17,323.2	1,385.86	16,396	9,368	58,721	26,691.2
Decrease during fiscal year 1912	19,571	7,077.0	566.19	[1]	[1]	9,397	201.0

TOTAL SENT ABROAD DURING THE FISCAL YEAR 1912.

Item.	Number.	Weight.	Postage.
		Pounds.	
Packages to which postage was affixed	42,325	17,323.2	1,385.86
Packages sent through the international exchange, Smithsonian Institution	16,396	9,368.0	[2]
Grand total	58,721	26,691.2	1,385.86

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[1] Shipments through the Smithsonian Institution exceeded last year by 10,174 packages, 6,876 pounds.

[2] The Smithsonian Institution is reimbursed from the department's contingent fund at the rate of 5 cents per pound.

The work done by machinery in addressing, folding, and flexotyping has greatly increased during the present year. Lists aggregating 603,075 addresses, including the divisional lists of the various offices, bureaus, and divisions of the department are maintained on stencils. The total number of addresses run off was 6,673,278, of which 2,833,492 were for the Monthly List of Publications, 1,689,142 for Crop Reporter, and 2,150,644 for miscellaneous publications, comprising principally the divisional lists of the various offices and divisions of this department.

The care of the lists is an important feature, as is shown by the fact that 51,392 stencils were cut for the Monthly List during the past year, 60,395 for the miscellaneous list, and 17,889 for the list to which is sent the Crop Reporter. Addresses numbering 343,134 were removed during the year from the stencil lists, 97,075 of which were from the list to which is sent the Monthly List of Publications—this list being constantly in the course of revision—and 246,059 from various other stencil lists.

During the fiscal year 5,537,000 circulars and pamphlets were folded on the folding machines, 2,658,000 of which were Monthly List of Publications, 2,065,000 Crop Reporter, and 814,000 miscellaneous circulars and pamphlets.

In addition, 908,264 congressional franks and 113,625 sheets of paper were cut on the paper cutter set up in the machine room.

A very important work which is steadily increasing is the duplicating work done on the Flexotype machine. The rapidity and neatness of the work of this machine has commended it to the other bureaus, offices, and divisions, with the result that 16,077 pages of matter were set up and 664,890 copies made therefrom during the fiscal year just ended, being an increase of nearly 300 per cent over the amount reported for the previous year. In order to handle this additional work the entire force worked many extra hours, including work at night. The summary of the work of this class done for the various bureaus and offices, together with a detailed statement of the character and number of copies of each piece or job is herewith appended:

Number of Monthly List envelopes addressed	2, 833, 492
Number of addresses furnished for Crop Reporter	1, 689, 142
Number of addresses furnished for miscellaneous list	2, 150, 644
Number of stencils cut for Monthly List	51, 392
Number of stencils cut for miscellaneous list	50, 395
Number of stencils cut for Crop Reporter list	17, 889
Number of stencils removed from Monthly List	97, 075
Number of stencils removed from miscellaneous list	246, 059
Number of Monthly List folded	2, 658, 000
Number of Crop Reporter folded	2, 065, 000
Number of miscellaneous circulars folded	814, 000
Number of congressional franks cut	908, 264
Number of sheets of paper cut	113, 625

Summary of Flexotype work during fiscal year ending June 30, 1912.

	Copies.	Pages.
Office of the Secretary	1,290	14
Bureau of Statistics, miscellaneous	3,000	1
Biological Survey, miscellaneous	2,160	7
Bureau of Chemistry, miscellaneous	24,400	72
Bureau of Entomology, miscellaneous	15,860	23
Division of Publications, miscellaneous	388,975	51
Division of Publications, press notices	173,320	208
Office of the Solicitor, miscellaneous	18,385	447
Office of the Solicitor, notices of judgment	37,500	854
Total	664,890	1,677

RECOMMENDATIONS.

SALARIES.

The editorial assistants in this division do not now and never have received adequate compensation for the work they so cheerfully and efficiently perform. They have had the special technical training and experience which is absolutely necessary in publication work, and it is due largely to their expert knowledge that the publication work and printing of all kinds is so economically and promptly executed. An increase of $250 in the salary of the editor and assistant chief and of $200 in those of the editorial assistants now receiving only $1,600 is most earnestly recommended.

The division has but three draftsmen and they are overworked and underpaid, and an increase in their salaries would be but justice for the excellent work they perform. An additional draftsman at $1,200 is needed to keep the work up to date.

The salaries of at least three of the clerks in the administration office should be increased from $1,200 to $1,400 on account of the exceptionally efficient service they are rendering.

INCREASE IN PRINTING FUND.

The printing fund for the department for the fiscal year 1913 is $475,000, divided for expenditure as follows:

Weather Bureau	$47,000
Farmers' Bulletins	125,000
General printing and binding	303,000
Total	475,000

An increase of $12,500 for Farmers' Bulletins will be required to furnish quotas of 12,500 copies to the 43 additional Senators and Representatives of the Sixty-third Congress. An additional $25,000 is needed for general printing and binding. Early in the month of June, 1912, the fund for printing was exhausted, which caused the suspension of numerous new publications and administrative blanks, causing delay and inconvenience. The amount asked is less than the amount of the work which could not be ordered or completed the last fiscal year.

PUBLICATIONS FOR USE OF SCHOOLS.

The use of the department's publications by schools of all grades and universities continues to increase, the demand being far in excess of our ability to supply. An increase of the printing fund or a special appropriation for printing certain publications for this specific use is recommended.

REPORT OF THE CHIEF OF THE BUREAU OF STATISTICS.

United States Department of Agriculture,
Bureau of Statistics,
Washington, D. C., August 31, 1912.

Sir: I have the honor to submit herewith the report of the Bureau of Statistics for the fiscal year ended June 30, 1912.

Very respectfully,

Victor H. Olmsted,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTION.

The Bureau of Statistics during the fiscal year ended June 30, 1912, maintained the same organization as described in the annual report for the year ended June 30, 1911, and the work was similar in character to that accomplished in preceding years, as were also the means and methods employed in its prosecution. In order that the bureau's work and the lines along which it is carried may be understood by those not heretofore informed, it is advisable to state, briefly, its most prominent features of method and accomplishment.

MONTHLY CROP REPORTS.

The most important duty of the bureau is the preparation and issuance monthly of reports giving seasonable information concerning the acreage planted to the principal crops of the United States each year (covering approximately 87 per cent of the total crop area of the country), their condition from month to month during the growing season, and their yield per acre, total yield, and quality; also, the condition from month to month and relative production, expressed in percentages of full production, of minor crops. In addition, reports are made regarding the number, status, and values of farm animals, stocks of grain remaining in the possession of farmers at specified dates, and average prices received by farmers for leading products each month. A few other miscellaneous subjects are dealt with, such as causes of crop damage, movement of crops, farm wages, and progress of spring plowing and planting.

CORRESPONDENTS AND AGENTS.

The bureau's monthly crop reports are based on replies, made by voluntary correspondents throughout the agricultural sections of the United States and by salaried employees, to printed inquiries sent them from Washington, which embrace the subjects dealt with each month.

The salaried employees consist of State statistical agents and special field agents. A State statistical agent is employed in each State, for which he renders monthly reports to the bureau, based on reports received by him from correspondents throughout the State and on his personal knowledge and observation. Special field agents are assigned to duty in groups of States and perform travel throughout their respective territories, examining crops, interviewing farmers, country merchants, implement dealers, and others from whom dependable information can be obtained. Their reports each month to the bureau are based on the knowledge gained through such travel and on reports received by them from correspondents.

VOLUNTARY CORRESPONDENTS.

The voluntary correspondents consist of several classes or corps, the reports from each of which are tabulated and computed separately and independently from those of any other class.

There are two principal classes of voluntary correspondents who render monthly reports direct to the bureau; one class, designated "township" correspondents, report for the respective townships or vicinities in which they reside; and the other, called "county" correspondents, report for their respective counties as a whole, each one of them having two or more assistants in different sections of the county, whose reports to him he utilizes in preparing his monthly report to the bureau.

In addition to the township and county correspondents mentioned above, the bureau maintains several special lists of voluntary correspondents who are requested from time to time to render reports. These special lists are as follows: "Individual farmers," who supply information at harvest time regarding yields; "special price" correspondents, who report as to prices received by farmers for their products; "cotton ginners," whose addresses are supplied by the Bureau of the Census; "special cotton" correspondents, who furnish information relative to cotton acreage and yield; "special potato" correspondents, who report as to stocks of potatoes on hand January 1; "mills and elevators," answering inquiries regarding grain; "special live-stock" correspondents and "veterinarians," who make reports regarding farm animals; and "special tobacco" correspondents, who supply information as to the tobacco crop. The total number of voluntary correspondents on all lists is about 130,000.

The results of the separate independent tabulations and computations of reports received from voluntary correspondents who report direct to the bureau (as distinguished from those who report to special field agents and State statistical agents) are brought together by States and, in conjunction with the reports from special field agents and State statistical agents, form the basis of each of the monthly reports issued by the bureau.

All reports received at Washington from the various classes of voluntary correspondents are tabulated and computed in the Division of Domestic Crop Reports, the work of which is referred to later. The voluntary correspondents are public-spirited citizens, rendering service without compensation other than the publications of the department and such limited quantities of seeds as can be supplied them.

As an illustration of the long service of many correspondents it may be stated that of the entire list of county correspondents enrolled in January, 1912, 88 per cent had served more than 1 year, 67 per cent more than 3 years, 42 per cent more than 6 years, 21 per cent more than 11 years, 4 per cent more than 26 years, and 1 per cent more than 36 years, the average length of service of all the county correspondents being about 7 years. The stability of service of the correspondents, as above indicated, is evidence of a high standard of quality. Careless or indifferent farmers will not take the pains to report, month after month and year after year, without money compensation. Voluntary correspondents render a service of great value, not only to themselves cooperatively, and to the farmers of the country generally, but to the public at large, which profits by the more economical distribution of farm products brought about by a knowledge of general crop conditions.

PREPARATION OF MONTHLY CROP REPORTS.

The reports of State statistical agents and special field agents are forwarded by them, by mail or telegraph, to the Secretary of Agriculture, and delivered by him to the Bureau of Statistics. The reports of these agents regarding certain crops of a highly speculative character (corn, wheat, oats, and cotton) are retained in the possession of the Secretary until the morning of the day of issuance of the bureau's reports; those relating to other crops are delivered by the Secretary to the bureau when he receives them, to enable their tabulation long enough in advance of the preparation of each crop report to render them ready for use as soon as needed.

The results of the tabulations and computations, by States, of reports of voluntary correspondents are delivered to the chief of the bureau as they are completed for their tabulation in connection with the reports of the State statistical agents and special field agents referred to in the preceding paragraph.

The figures for each State derived from the reports of each class of correspondents and agents are tabulated in parallel columns on sheets, each of which has reference to a separate crop or subject, so that the figures for each crop or subject in each State are in juxtaposition; and the reports of the bureau, from month to month, are derived from the figures thus brought together.

The work of finally making the bureau's crop estimates, each month, culminates at sessions of the Crop Reporting Board, composed of five members, including the chief of the bureau, who presides as chairman. The personnel of the board is changed each month. The meetings are held in the office of the chief of bureau, which is kept locked during the sessions, all telephones being disconnected. The procedure of the board and the method of issuance of reports are described in the annual reports of the bureau for 1905 (in which year the board was established), 1906, 1907, and in circular No. 17 of this bureau.

SCOPE OF CROP REPORTS.

The following tabulation is designed to show, in abbreviated form, the scope of monthly crop inquiries of the Bureau of Statistics, in 1912, and the time and nature of inquiry for each crop; slight modifications may be made from time to time during 1913, but it is not thought that any material change will be made. Characters are placed under months in which reports are published. Explanatory key is given at the bottom of the tabulation.

Scope of monthly crop inquiries.

Crop.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Cereals:											
Barley	v +	sf			Ac	c	cs	c	Yq	w	F
Buckwheat	v +						Ac	c	c	Yq	F
Corn	v +	sfm				Ac	c	c	c	sYq	F
Oats	v +	sf			Ac	c	sc	c	Yq	w	F
Rice						Ac	c	c	c		rF
Rye	v +		c	c	c	c	AYq				AcF
Wheat (all)	v +	sf				s					
Wheat (spring)					Ac	c	c	c	Yq	w	F
Wheat (winter)			c	rc	c	c	Yq			w	AcF
Forage (grasses):											
Alfalfa					c	c	c	p			
Bluegrass (seed)					c	c	c	p			
Canadian peas					c	c	c	c	p		
Clover (hay)					ac	c	pq				
Clover (seed)								ac	p		
Cowpeas						c	c	c	c	yp	
Hay (all)	v +			sfc	c	c	Ac	Yq			F
Kafir corn						c	c	c	p	ayp	
Millet						c	c	c	p		
Pastures				c	c	c	c				
Timothy						c	c				
Fruits:											
Apples	v +				c	c	c	c	c	ypq	
Blackberries					c	c	p				
Cantaloupes					c	c	c	p			
Cranberries								c	c	ypq	
Grapes						c	c	c	c	ypq	
Lemons						c	c	c	c	c	p
Oranges						c	c	c	c	c	p
Peaches					c	c	c	p			
Pears					c	c	c	c	c	ypq	
Raspberries					c	c	p				
Strawberries						p					
Watermelons					c	c	c	p			
Vegetables:											
Asparagus					p						
Beans (dry)	v +					c	c	c	p		
Beans (Lima)					c	c	c	c	p		
Cabbages	v +				c	c	c	c	p		
Onions	v +				c	c	c	c	p		
Potatoes	sv +					Ac	c	c	c	Yq	F
Sweet potatoes	v +					ac	c	c	c	yq	v
Tomatoes						c	c	c	p		
Miscellaneous:											
Broom corn	v +					c	c	c	p		
Cotton	v +			F	Ac	c	c	c	c		rY
Flaxseed	v +					Ac	c	c	c	Yq	F
Hemp					c	c	c	c	p		
Hops						c	c	c	yq		
Peanuts						c	c	c	c	ypq	
Planting				%							
Plowing				%							
Sorghum						ac	c	c	c	y	v
Sugar beets					c	c	c	c	c	c	ayp
Sugar cane					ac	c	c	c	c	c	p
Tobacco						Act	c	c	c	Yq	TF
Wool						w					
Live stock:											
Horses	nv +		dc								
Mules	nv										
Milch cows	nv +										
Other cattle	nv +										
All cattle			dec								
Spring lambs			de								
Sheep	nv +		dec								
Swine	nv +		dcb					hc			

KEY.—(A) Acreage—percentage of last year and total. (a) Acreage in percentage of last year only. (b) Number of breeding sows compared with last year. (c) Condition. (d) Losses from disease. (e) Losses from exposure. (F) Final estimates of acreage, and value. (f) Percentage of crop shipped out of county where grown. (h) Number stock hogs compared with year ago. (m) Percentage of crop of merchantable quality. (n) Number. (p) Percentage of full crop produced. (q) Quality. (r) Acreage remaining after abandonment. (s) Supplies on farms. (t) Area and condition by types. (T) Acreage, production, and value by types in December Supplement. (v) Values. Prices of products marked (v+) in January are asked each month. (w) Weight per bushel or fleece. (Y) Yield per acre and total production. (y) Yield per acre only. (%) Percentage done May 1.

REVISION OF ESTIMATES.

The reports issued by the Bureau of Statistics from month to month do not purport to be other than estimates; they are not the results of actual enumerations as are the figures reported decennially by the Bureau of the Census. Every quantitative estimate of this bureau, whether relating to acreage and production of crops or numbers of live stock, is nothing more than a consensus of judgment of many thousands of correspondents and a limited number of agents.

The annual estimates regarding acreage of crops and number of live stock are based on corresponding estimates for each preceding year, there being no other bases to which can be applied the percentages of increase or decrease indicated by reports received from correspondents and agents, except once in 10 years, when census figures become available.

When the figures of the last census became available, showing the number of each class of live stock on farms in 1910 and the areas of crops in 1909, they were adopted as bases for subsequent estimates, which were arrived at by applying the percentages of increase or decrease for the year following the census to the census figures.

It is, of course, out of the question that an agricultural census be taken every year; the expense would be prohibitive. The only way in which the constant and increasing demand for current information can be met is through carefully made estimates. It is not claimed that the estimates of the Bureau of Statistics are exactly accurate; no estimate can be. They are given as the best available data, representing the fullest information obtainable at the time they are made.

It is apparent that estimates made monthly, from year to year, following each other during a period of 10 years, without means of verification or correction, are likely to be more or less out of line with conditions at the end of the 10-year period as disclosed by actual census enumerations. Cumulative errors, impossible of discovery, are likely to occur and can not be corrected until census reports are available.

If the requirement that an agricultural census be taken hereafter every five years is carried into effect, the estimates of this bureau can be checked up and adjusted to the facts as disclosed by the quinquennial enumerations, and new bases for estimates be provided every five years, resulting in corresponding reduction in the extent of cumulative errors or other divergencies.

The estimates of the bureau are made promptly, for current use; the results of actual enumerations by census methods can not be made known until a year or more has elapsed after the agricultural data have been gathered. Constant effort is made to render the estimates as closely approximate to the facts as is possible; and, when census figures are available, they are used for the purpose of revision and adjustment to increase their accuracy; but when not available, dependence must, of necessity, be placed on the consensus of judgment of the bureau's correspondents and agents.

The results of the agricultural census which related to 1909 were not published in time to permit a revision of estimates until the close of 1911, when revisions, for all crops for which census figures were then obtainable, were made and published in the Supplement to the Crop Reporter for December, 1911; and the revision of the bureau's estimates regarding live stock, based on census figures, was published in the Crop Reporter for February, 1912.

THE CROP REPORTER.

The Crop Reporter is an eight-page publication issued monthly under the authority of the Secretary of Agriculture, in which are published the monthly reports of the Bureau of Statistics, with other current statistical information regarding agriculture, including farm values and market prices of important products and data relative to crops in foreign countries. The Crop Reporter, of which 175,000 copies are printed each month, is sent to all who request it. It is circulated principally among farmers, including the bureau's voluntary correspondents, throughout the United States.

Among the subjects of interest considered in the Crop Reporter during the past fiscal year may be mentioned the following: "Interpretation of Crop Condition Figures;" "Wheat Movement from Farms, Monthly, 1910–11;" "Per Capita Imports and Exports of Agricultural Products—by Decades Since 1866;" "Monthly Movement of Grain;" "Sugar-Beet Production in United States, 1910;" "Durum Wheat Exports, 1910–11;" "Cost of Producing Barley;" "Bushels of Weight and Bushels of Volume;" "Wheat Prices in England, Six Centuries, chart;" "Cost of Producing Potatoes in United States, by Grand Divisions;" "Hop Movement in United States, 1902–1911;" "Causes of Crop Damage, 1909–10;" "Stocks of Potatoes, January 1, 1912;" "Seedtime and Harvest;" "Quantity of Wheat and Oats Sown per Acre, by States;" "Wheat Supply and Distribution, by States;" "Wheat Consumption Per Capita, by Countries;" "Egg Receipts at Seven Markets Annually Since 1891;" "Live-Stock Receipts at Seven Markets Annually Since 1900;" "Farm Wages, 1911;" "Stock of Wheat in Interior Mills and Elevators;" "Length of Service of Crop Correspondents;" "High Prices and Crop Production;" "Apple Shipments on Important Railroads;" "Index Numbers of Production Per Capita and Prices of Important Farm Products, 1866–1911;" "Testing of Germinating Quality of Corn;" "Causes and Extent of Cotton Damage;" "Railroads and Agriculture."

DIVISION OF DOMESTIC CROP REPORTS.

To this division is consigned the great mass of data contained in the reports of voluntary correspondents. All such returns are here distributed by States, and subsequently by districts or counties, for comparison and detection of errors, after which they are tabulated and their averages determined.

During the fiscal year 1912 improvements in the methods of securing and tabulating information regarding crop estimates have been made. A new basis for ascertaining a requisite number of correspondents in minor subdivisions of States has been adopted, namely, the number of farms in each county as shown by the census of 1910, which permits of a variation in the number of crop correspondents to correspond more exactly with the agricultural importance of the county. A system of tabulating the returns from township correspondents by districts has also been introduced, permitting a more satisfactory comparison of these returns.

The names, location, and records of correspondents are kept in this division. The magnitude of the detail work incident to the collection of required information is indicated by the fact that 1,930 days' labor were required during the past year to maintain the lists of voluntary correspondents.

The number of inquiries mailed from this division to the regular monthly correspondents in 1912, as compared with the number mailed in the year 1911, increased 5 per cent. The regular schedules of inquiry for the past year contained 39 more questions than those of the previous year.

The time of this division is principally employed on work connected with the monthly crop reports, but much has been done in tabulating and computing data connected with special inquiries for this bureau and other bureaus of the department. During the past year 85.8 per cent of the time was devoted to crop reports, 12.9 per cent to work for other divisions, and 1.3 per cent to work for other bureaus, compared with 76.8 per cent for crop reports, 22.9 per cent for other divisions, and 0.3 per cent for other bureaus in 1911. The time chargeable to the crop report, which decreased from 96.1 per cent in 1907 to 74.9 per cent in 1910, is again tending upward, owing to the increase in special inquiries and other work chargeable to the crop report.

Although there has been an increase of about 275 per cent in the work since 1907, the force, which averaged 45 clerks in that year, and 43 in 1910 and 1911, was but 42 in 1912. The work has increased from year to year and now taxes to the limit the ability of the clerical force to dispose of it. Any further expansion must be met by an increase in the number of clerks.

DIVISION OF PRODUCTION AND DISTRIBUTION.

This division is engaged in a wide range of work. An investigation during the last fiscal year was concerned with the economic results of cold storage and the relationship of cold storage to prices. The basic materials of this work were returns made by cold-storage warehouses in all parts of the country, covering their business for two years, with details of commodities received and delivered during each month of the two years. Much subsidiary information was obtained from many other sources, all of a statistical character. The aggregate information obtained in this investigation constitutes, in variety and mass, much the largest body of facts concerning this business in its economic aspect that has been collected.

The latest comprehensive investigation of the wage rates of farm labor was completed during the past year, so that the department now has a record of averages of such wage rates for each State, for geographic divisions of States, and for the United States extending back to 1866. A simultaneous investigation was conducted with regard to the supply of such labor, and this constitutes the first comprehensive treatise that has been published on this subject.

For a long time requests for a list of agricultural fairs and exhibitions, addressed to this department, have had to be answered with the statement that no such list has been published by this department. On account of the popular interest in the subject, this division has compiled lists of not only the regular State and county fairs, but also other fairs and exhibitions of the regular sort that are in any way concerned with agriculture.

The efforts of railroad companies to promote agriculture, especially by soliciting settlers to farm lands, by aiding in agricultural education, and by making other special efforts not strictly to be classed as transportation, were treated in a bulletin which went to press about the close of the fiscal year. The aim of this undertaking is to make, practically, a complete survey of the activities of the railroad companies in the promotion of agriculture.

Much work has been done during the year in ascertaining the dates of planting and harvesting principal crops. In a bulletin published during the year are embraced the dates of harvesting corn, winter wheat, spring wheat, fall-sown oats, spring-sown oats, barley, rye, buckwheat, flax, cotton, and tobacco. The collection and tabulation of materials for another bulletin relating to the forage crops was nearly completed. At the same time a third line of work, the dates of planting and harvesting vegetable crops, has been in hand. In the meantime a bulletin has been prepared to perform the service of a key to find information in the series of bulletins relating to seedtime and harvest in each county and small group of counties.

A system was established for the collection of annual statistics of cane-sugar and sugar-cane production in the United States and its insular possessions. Statistics of the campaign of 1911–12 for most of Louisiana and Texas and of the campaign of 1910–11 for Hawaii and Porto Rico had been obtained by the close of the fiscal year 1912.

This division has compiled a series of tables covering the international trade of the world in principal agricultural products for a period of time extending back to about 1900, the results of which have been published annually in the Yearbooks of this department. There is a steady and frequent demand for the results of this compilation; and, for the convenience of the department and of the public, it has been deemed advisable to revise the tables heretofore published and embrace them in a bulletin. The products for which this work has been done are corn, wheat, wheat flour, cotton, tobacco, rice, hops, sugar, tea, coffee, oil cake, oil-cake meal, rosin, spirits of turpentine, india rubber, wood pulp, hides and skins, butter, cheese, and wool.

An article was prepared for the Yearbook of 1911 on the reduction of waste in marketing fresh fruits and vegetables, as effected by improved methods of distribution and by better transportation facilities. An investigation into local variations in farm prices, as shown in returns from individual counties, was begun, and considerable work was done in the preparation of tables and maps.

The regular annual publications prepared in this division included the bulletin on exports of farm and forest products from the United States; the corresponding imports bulletin; a statement in the Crop Reporter giving shipments of apples on railroads of the United States for the crop of 1911, and another statement showing exports of durum wheat. Monthly receipts of eggs and poultry by country dealers and at large cities were shown regularly in the Crop Reporter. The production and domestic supply of cotton, tobacco, rice, and hops in the United States, from the earliest available date to the latest, were shown in four circulars. These statistics were formerly included in the Yearbook.

DIVISION OF RESEARCH AND REFERENCE.

The work of this division during the past fiscal year has in general consisted of: (1) The assembling of statistical and other data and the composition of text for bulletins and circulars; (2) compiling, reducing to equivalents in United States units, and coordinating for publication in the Yearbook official statistics of various foreign Governments on the area and production of certain crops; (3) preparing answers to requests from other departments, other bureaus of this department, statesmen, economists, statisticians, educators, commercial exchanges, and business men, for statistics relating to agriculture and allied subjects; (4) reading and revising all manuscript prepared in the bureau for publication; (5) translating from foreign languages for the use of the bureau; (6) management and care of the bureau's statistical library and the maintenance of a card index of the agricultural statistics contained therein; (7) stenography and typewriting.

Ten circulars, each entitled "Foreign Crops," have been prepared in the division at regular intervals during the year. In addition thereto, 2 bulletins, 7 circulars, 2 Yearbook separates, 12 monthly editions of the Crop Reporter, and 3 miscellaneous publications, all prepared in other branches of the bureau, have been read and revised both in manuscript and in proof in this division.

Four bulletins entitled, respectively, "The World Production, Trade, and Consumption of Coffee," "Some Statistical Results of Farm Bookkeeping in Switzerland," "Land and Labor," and "Comparative Prices of Staple Products in Leading Markets of the United States," are now being prepared in the division and will probably be ready for publication during the next fiscal year.

The remaining work of the division has varied little from the usual routine; statistical statements have been compiled from foreign and domestic publications, in response to many hundred inquiries for information respecting various phases of agriculture, prices, etc., in the United States and various foreign countries, and much other research work of a miscellaneous character has been completed which is not readily classifiable in condensed terms.

The statistical library, which forms the basis of the division's research work, has during the year been considerably enlarged and improved, special attention having been paid to completing the files of official statistical reports of foreign countries on their import and export trade. The collection of agricultural and commercial statistical literature is now fairly complete.

SUPERVISION OF FIELD SERVICE.

The time and attention of the assistant statistician has been devoted particularly to the supervision of the field service of the bureau. The inspection and instruction of the agents in the different States have required his presence in the field during the greater portion of the past year. It has been possible to inspect the work of all agents once, and that of those of the States of the Mississippi Valley and the South twice.

When the special field service (traveling agents) was established several years ago no systematic method of procedure was required of the agents, each agent being permitted by reason of his training or experience to use his own method, to a large extent, in collecting information required by the bureau. As the service was enlarged and developed variations in method, or lack of method, forbade the best results. Experience has since enabled the bureau to determine and establish uniform methods for the guidance of its traveling field agents.

The enforcement of these methods, set forth in recent instructions and reenforced by personal inspection and instruction by the assistant statistician, and the experience gained through long service, has resulted in an appreciable increase in the efficiency of the special field agents.

It is most desirable that these employees of the department receive compensation commensurate with their valuable service. The necessity of the bureau for additional men has compelled appointments at inadequate salaries and prevented promotions deserved by some of the older agents.

The work of the State statistical agents has reflected the benefit of the improved methods inaugurated in 1911, referred to in the bureau's last report, and their personal instruction by the assistant statistician has resulted in increased efficiency.

The force of State statistical agents was established 30 years ago and is now doing more and better work than ever before. The number of crop inquiries upon which they report has increased very largely of late years, without correspondingly increased remuneration. Provision should be made for larger compensation to the more efficient of these agents, particularly those in States in which the work has grown most noticeably.

The assistant statistican during brief periods when in Washington has assisted in the administrative and statistical work of the bureau and served on the crop reporting board.

CHIEF CLERK.

The work of the office of the chief clerk relates to the general supervision of the personnel of the clerical force, messengers, laborers, and other employees; maintenance of the bureau's financial and property accounts, time records, cost records, and files; purchase, custody, and distribution of supplies; preparation of salary rolls and vouchers; administrative audit of accounts; multigraph duplicating work; handling of mail; distribution of department publications and seeds to correspondents of the bureau, and correspondence concerning the foregoing. The work of this office has greatly increased.

The bureau is badly handicapped by lack of storage space in the main building in which it is located. The present space in the bureau and in the storeroom in the basement is wholly inadequate for the proper handling and disposition of necessary supplies. Through an arrangement with the chief clerk of the department space has been obtained for the storage of 400,000 official envelopes, for emergency use, in the department warehouse at Alexandria, Va.; this, however, is not convenient for the storage of other supplies, which are needed daily.

Various improvements have been made during the year to increase office space. Alterations were made in the Division of Domestic Crop Reports, affording additional space for new equipment. The supply cases in the stock room were rearranged and a few new ones added, giving more capacity and additional room for the handling of office supplies. Additional metal book stacks, computing machines, desks, and filing cabinets have been installed. Several modern filing cabinets and typewriters were furnished agents in the field.

THE PURCHASING POWER OF FARM PRODUCTS.

In 1910 an investigation was made in the Bureau of Statistics, which showed that the money value of 1 acre of the farmer's crops in 1909 was 72.7 per cent more than the money value of 1 acre of his crops in 1899; that the average money value of the articles which a farmer buys was about 12.1 per cent higher in 1909 than in 1899; and, consequently, as a result of the greater increase in price of what a farmer sells than in price of what he buys, the net increase in the purchasing power of the produce of 1 acre was 54 per cent. That is, the product of 1 acre in 1909 would exchange for 54 per cent larger quantity of the things farmers buy than the product of 1 acre in 1899. So much public interest has been evinced in this line of inquiry, bearing so closely upon the subject of the "cost of living," that it has been continued during the past two years.

Although the aggregate production of crops in 1911 was about 6.3 per cent smaller than in 1910 and 0.5 per cent smaller than in 1909, the total money value of crop production in 1911, by reason of enhancement in prices, was about 2.1 per cent greater than in 1910 and 3 per cent greater than in 1909. According to a report of the Bureau of the Census, the value of all crops in the United States in 1909 was about $5,487,000,000; on this basis it is estimated that the money value of all crops in 1910 was about $5,537,000,000, and of crops in 1911, $5,654,000,000.

The money value of 1 acre of produce in 1911 averaged about $15.48, as compared with $15.50 in 1910, $15.99 in 1909, and $9.48 in 1899. The larger aggregate value of crops in 1911 than in 1910 and 1909 was due to increased acreage in conjunction with enhancement of prices.

The estimates here given are based upon data received for crops covering about 90 per cent of the area of all field crops and may be assumed to be representative of all crops.

An investigation of prices of about 85 articles generally purchased by farmers indicates that such articles averaged in price in 1911 about 1.1 per cent higher than in 1910, 2.6 per cent higher than in 1909, and about 15.3 per cent higher than in 1899.

Taking into consideration the variation in the price of things which farmers buy and in the things which farmers sell, it appears that the purchasing power of 1 acre of crops in 1911 was 1.2 per cent less than in 1910, 5.7 per cent less than in 1909, and 41.6 per cent greater than in 1899.

The purchasing power of 1 acre of corn in 1911 was 9 per cent greater than in 1910, 4.1 per cent less than in 1909, and 50.7 per cent greater than in 1899.

The purchasing power of 1 acre of wheat in 1911 was 11.7 per cent less than in 1910, 29.8 per cent less than in 1909, and 30.2 per cent greater than in 1899.

The purchasing power of 1 acre of cotton in 1911 (excluding value of the seed) was 20.6 per cent less than in 1910, 10.2 per cent less than in 1909, and 32.3 per cent more than in 1899.

Upon the basis of the purchasing power of the value of 1 acre of produce, the year 1909 stands as the most prosperous of recent years and, apparently, the most prosperous for farmers of the past 50 years for which there are records.

Statistical details follow:

TABLE 1.—*Acreage and yield per acre of specified crops in 1911, 1910, 1909, and 1899.*

	Acres (000 omitted).				Yield per acre.[1]			
	1911	1910	1909 (Census.)	1899 (Census.)	1911	1910	1909	1899
Corn	105,825	104,035	98,383	94,914	23.9	27.7	25.9	28.1
Wheat	49,543	45,681	44,261	52,589	12.5	13.9	15.4	12.5
Oats	37,763	37,548	35,159	29,540	24.4	31.6	28.6	31.9
Barley	7,627	7,743	7,698	4,470	21.0	22.5	22.5	26.8
Rye	2,127	2,185	2,196	2,054	15.6	16.0	13.4	12.4
Buckwheat	833	860	878	807	21.1	20.5	16.9	13.9
Potatoes	3,619	3,720	3,669	2,939	80.9	93.8	106.1	93.0
Hay, tame	48,240	51,015	51,040	43,127	1.14	1.36	1.35	1.25
Tobacco	1,013	1,366	1,295	1,101	893.7	807.7	815.3	788.5
Flaxseed	2,757	2,467	2,083	2,111	7.0	5.2	9.4	9.5
Cotton	36,045	32,403	30,938	24,275	208.2	170.7	154.3	186.0
Total above	295,392	289,023	277,600	257,927				
All crops [2]			311,293	283,218				

[1] Hay in tons, tobacco and cotton in pounds, other crops in bushels.

[2] Total acreage of crops having acreage reports in the census returns; it excludes some crops, such as maple sugar and sirup and forest products of farms; also such as orchard fruits, grapes, tropical fruits and nuts, the number of trees and vines having been secured in lieu of acreage. The value of crops for which reports of acreage were secured in 1910 was nearly nine-tenths of the value of all crops.

TABLE 2.—*Total production and value (in millions) of specified crops 1911, 1910, 1909, and 1899.*

	Production (000,000 omitted).[1]				Value (on basis of prices Dec. 1 to farmers) (000,000 omitted).			
	1911	1910	1909	1899	1911	1910	1909	1899
Corn	2,531	2,886	2,552	2,666	$1,565	$1,385	$1,477	$808
Wheat	621	635	683	659	543	561	674	385
Oats	922	1,186	1,007	943	415	408	405	235
Barley	160	174	173	120	139	100	94	48
Rye	33	35	30	26	28	25	21	13
Buckwheat	18	18	15	11	13	12	10	6
Potatoes	293	349	389	273	234	195	211	107
Hay	55	69	69	54	785	842	722	439
Tobacco	905	1,103	1,056	868	85	102	107	57
Flaxseed	19	13	20	20	35	29	30	20
Cotton	7,506	5,552	4,783	4,514	732	820	688	324
Total					4,574	4,479	4,439	2,442

[1] Hay in tons, tobacco and cotton in pounds, other crops in bushels (000,000 omitted).

TABLE 3.—*Prices of specified products, and value per acre, 1911, 1910, 1909, and 1899.*

	Farm price, Dec. 1.[1]				Value per acre; basis, Dec. 1 price.				Per cent increase or decrease in value per acre, 1911, compared with—		
	1911	1910	1909	1899	1911	1910	1909	1899	1910	1909	1899
									P. c.	*P. c.*	*P. c.*
Corn	61.8	48.0	57.9	30.3	$14.79	$13.31	$15.02	$8.51	+11.1	− 1.5	+ 73.8
Wheat	87.4	88.3	98.6	58.4	10.96	12.28	15.22	7.30	−10.7	−28.0	+ 50.1
Oats	45.0	34.4	40.2	24.9	10.98	10.88	11.52	7.94	+ 0.9	− 4.7	+ 38.3
Barley	86.9	57.8	54.0	40.3	18.38	12.97	12.15	10.80	+41.7	+51.3	+ 70.2
Rye	83.2	71.5	71.8	51.0	12.96	11.42	9.65	6.32	+13.5	+34.3	+105.1
Buckwheat	72.6	66.1	70.1	55.7	15.29	13.53	11.87	7.74	+13.0	+28.8	+ 97.5
Potatoes	79.9	55.7	54.1	39.0	64.60	52.30	57.42	36.27	+23.5	+12.5	+ 78.1
Hay, tame	14.3	12.1	10.5	7.3	11.38	16.51	14.15	10.18	−31.1	−19.6	+ 11.8
Tobacco	9.4	9.3	10.1	6.6	84.13	74.77	82.35	52.02	+12.5	+ 2.2	+ 61.7
Flaxseed	182.1	231.7	152.6	98.2	12.79	11.95	14.32	9.30	+ 7.0	−10.7	+ 37.5
Cotton	8.8	14.2	13.9	7.2	20.32	25.32	22.06	13.34	−19.7	− 7.9	+ 52.3
Total	......	......	......	......	15.48	15.50	15.99	9.47	− 0.1	− 3.2	+ 63.5

[1] Hay in dollars per ton, tobacco and cotton in cents per pound, other crops in cents per bushel.

TABLE 4.—*Yearly value per acre of 10 crops combined.*

[Corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, tobacco, and cotton, which comprise nearly 90 per cent of the area in all field crops, the average value per acre of which closely approximates the value per acre of the aggregate of all crops.]

1911	$15.51	1899	$9.13	1887	$10.14	1875	$12.20
1910	15.53	1898	9.00	1886	9.41	1874	13.25
1909	16.00	1897	9.07	1885	9.72	1873	14.19
1908	15.32	1896	7.94	1884	9.95	1872	14.86
1907	14.74	1895	8.12	1883	10.93	1871	15.74
1906	13.46	1894	9.06	1882	12.93	1870	15.40
1905	13.28	1893	9.50	1881	13.10	1869	14.67
1904	13.26	1892	10.10	1880	13.01	1868	14.17
1903	12.62	1891	11.76	1879	13.26	1867	15.09
1902	12.07	1890	11.03	1878	10.37	1866	14.17
1901	11.43	1889	8.99	1877	12.01		
1900	10.31	1888	10.30	1876	10.80		

TABLE 5.—*Comparative prices of articles purchased by farmers in 1911, 1910, 1909, and 1899.*

Many articles enumerated below vary widely in grades, quality, or size and consequently vary widely in prices; prices given are approximate averages for the United States of the grades or qualities most generally sold to farmers; prices given for the different years are for the same grades or qualities.]

	Comparative prices.				Percentage of 1911 price compared with price in—		
	1911	1910	1909	1899	1910	1909	1899
Coal oil, gallon...cents..	12.4	13.0	14.2	15.1	95.4	87.3	82.1
Coffee, pound...do....	27.0	22.5	18.9	17.2	120.0	142.9	157.0
Flour, barrel...dollars..	6.08	5.90	6.30	4.76	103.0	96.5	127.7
Lard, pound...cents..	14.0	15.8	15.5	10.1	88.6	90.3	138.6
Matches...do....	5.0	5.0	5.0	5.0	100.0	100.0	100.0
Salt, barrel...dollars..	1.68	1.62	1.60	1.39	103.7	105.0	120.9
Soap, cake...cents..	4.29	4.26	4.19	3.99	100.7	102.4	107.5
Starch, pound...do....	6.9	6.8	6.8	6.6	101.5	101.5	104.5
Sugar, pound...do....	6.75	5.75	5.80	5.33	117.4	116.4	126.6
Tobacco, plug, pound...do....	44.7	44.4	43.6	40.3	100.7	102.5	110.9
Brooms, each...do....	50.0	48.0	43.0	28.0	104.2	116.3	178.6
Dish pans, each...do....	40.0	40.0	40.3	37.1	100.0	99.3	107.8
Dinner plates, set ½ dozen...do....	52.0	51.7	52.4	49.6	100.6	99.2	104.8
Fruit jars, dozen...do....	80.0	78.4	78.4	72.8	102.0	102.0	109.9
Kitchen chairs, each...do....	72.7	70.7	70.3	62.3	102.8	103.4	116.7
Lamps, each...do....	49.1	48.2	48.2	46.0	101.9	101.9	106.7
Stoves, each...dollars..	28.56	28.00	27.40	24.75	102.0	104.2	115.4
Tin pails, each...cents..	24.5	24.5	24.4	23.0	100.0	100.4	106.5
Wooden buckets, each...do....	34.8	33.0	32.0	26.6	105.4	108.8	130.8
Wooden washtubs, each...do....	88.6	85.2	82.6	70.4	104.0	107.3	125.9

TABLE 5.—*Comparative prices of articles purchased by farmers, etc.*—Continued.

	Comparative prices.				Percentage of 1911 price compared with price in—		
	1911	1910	1909	1899	1910	1909	1899
Gloves, pair.....cents..	87.1	85.4	84.4	71.6	102.0	103.2	121.6
Hats, each.....dollars..	1.91	1.90	1.88	1.67	100.5	101.6	114.4
Jumpers, each.....cents..	79.8	78.5	74.0	61.4	101.7	107.8	130.0
Overalls, pair.....do....	87.6	84.6	80.6	65.6	103.5	108.7	133.5
Raincoats, each.....dollars..	4.09	4.05	3.97	3.32	101.0	103.0	123.2
Rubber boots, pair.....do....	4.36	4.25	3.89	3.01	102.6	112.1	144.9
Shirts, flannel, each.....do....	1.46	1.45	1.44	1.21	100.7	101.4	120.7
Shoes, brogan, pair.....do....	2.07	1.99	1.94	1.48	104.0	106.7	139.9
Calico, yard.....cents..	6.8	6.7	6.5	5.2	101.5	104.6	130.8
Muslin, yard.....do....	9.4	9.4	9.0	7.2	100.0	104.4	130.6
Sheeting, yard.....do....	19.3	19.4	18.2	14.3	99.5	106.0	135.0
Axes, each.....do....	99.4	99.3	100.4	91.4	100.1	99.0	108.8
Barb wire, 100 pounds.....dollars..	3.07	3.15	3.16	2.96	97.5	97.1	103.7
Dung forks, each.....cents..	75.9	75.1	72.7	65.3	101.1	104.4	116.2
Hatchets, each.....do....	61.8	61.9	61.6	56.2	99.8	100.3	110.0
Lanterns, each.....do....	78.7	82.6	86.9	81.7	95.3	90.6	96.3
Nails, 100 pounds.....dollars..	3.08	3.13	3.15	2.98	98.4	97.8	103.4
Pitchforks, each.....cents..	58.9	58.4	56.8	50.8	100.9	103.7	115.9
Pincers, each.....do....	50.5	50.9	51.0	48.0	99.2	99.0	105.2
Saws, buck, each.....do....	85.2	85.0	84.6	78.2	100.2	100.7	109.0
Screw hooks, box.....do....	32.7	32.7	33.2	31.6	100.0	98.5	103.5
Screw eyes, box.....do....	32.1	32.1	32.4	31.0	100.0	99.1	103.5
Shotguns, each.....dollars..	13.25	13.34	13.34	14.52	99.3	99.3	91.3
Steel traps, each.....cents..	27.2	27.4	27.6	24.6	99.3	98.6	110.6
Shovels.....do....	77.4	77.6	76.8	70.0	99.7	100.8	110.6
Staples, 100 pounds.....dollars..	4.08	4.12	4.20	3.87	99.0	97.1	105.4
Steel wire, 100 pounds.....do....	3.65	3.71	3.76	3.57	98.4	97.1	102.2
Wire fence, rod.....cents..	33.3	33.6	33.9	32.0	99.1	98.2	104.1
Axle grease, box.....do....	10.2	10.1	10.0	9.6	101.0	102.0	106.2
Buggies, each.....dollars..	74.83	73.79	72.06	65.99	101.4	103.8	113.4
Buggy whips, each.....cents..	42.4	42.3	42.1	39.8	100.2	100.7	106.5
Corncutters, each.....do....	27.8	27.8	27.3	25.0	100.0	101.8	111.2
Churns, each.....dollars..	2.72	2.70	2.69	2.39	100.7	101.1	113.8
Cream separators, each.....do....	68.32	70.10	71.53	78.52	97.5	95.5	87.0
Grindstones, each.....do....	3.50	3.50	3.41	3.10	100.0	102.6	112.9
Halters, each.....cents..	93.5	92.0	88.5	78.9	101.6	105.6	118.5
Harness, single set.....dollars..	15.50	15.00	14.77	12.34	103.3	104.9	125.6
Horse blankets, each.....do....	2.06	2.00	1.98	1.77	103.0	104.0	116.4
Hoes, each.....cents..	46.4	45.9	44.8	38.8	101.1	103.6	119.6
Harrows, each.....dollars..	12.09	11.93	11.87	10.49	101.3	101.9	115.3
Manure spreaders, each.....do....	101.00	103.18	103.33	100.55	97.9	97.7	100.4
Mowers, each.....do....	47.90	47.89	47.23	46.01	100.0	101.4	104.1
Picks, each.....cents..	70.4	70.7	70.7	66.0	99.6	99.6	106.7
Plows, turning, each.....dollars..	11.75	11.53	11.45	10.76	101.9	102.6	109.2
Scythes, each.....cents..	102.0	102.0	100.0	86.1	100.0	102.0	118.5
Saddles, each.....dollars..	17.25	16.86	16.56	14.52	102.3	104.2	118.8
Tedders, each.....do....	40.00	39.65	38.42	35.91	100.9	104.1	111.4
Wagons, single, each.....do....	50.00	48.78	47.45	44.47	102.5	105.4	112.4
Wagons, double, each.....do....	74.40	72.41	68.83	60.72	102.7	108.1	122.5
Carbolic acid, crude, pound.....cents..	36.0	35.4	35.0	30.0	101.7	102.9	120.0
Copperas, pound.....do....	10.2	10.1	10.0	10.0	101.0	102.0	102.0
Lime, barrel.....dollars..	1.32	1.30	1.29	1.12	101.5	102.3	117.9
Paris green, pound.....cents..	30.0	30.5	30.5	27.0	98.4	98.4	111.1
Sulphur, pound.....do....	8.6	8.5	8.5	8.5	101.2	101.2	101.2
Witch-hazel, pint bottle.....do....	25.3	25.3	25.0	25.0	100.0	101.2	101.2
Baskets, one-half bushel, each.....do....	38.0	37.6	36.6	27.9	101.1	103.8	136.2
Milk cans, 10-gallon, each.....dollars..	2.71	2.70	2.68	2.56	100.4	101.1	105.9
Milk pails, each.....cents..	50.0	49.9	49.7	45.3	100.2	100.6	110.4
Paints, ready-mixed, gallon.....dollars..	2.05	1.88	1.62	1.29	109.0	126.5	158.9
Paint brushes, each.....cents..	79.1	78.2	76.3	67.9	101.2	103.7	116.5
Rope, hemp, pound.....do....	12.7	13.0	13.6	12.4	97.7	93.4	102.4
Sacks, grain, each.....do....	19.6	19.0	18.0	14.0	103.2	108.9	140.0
Scales, small, each.....dollars..	2.00	2.00	2.00	1.85	100.0	100.0	108.1
Twine, binder, 100 pounds.....do....	9.21	9.40	9.74	9.06	98.0	94.6	101.7
Average, all articles.....	....	....	....	....	101.09	102.64	115.32

TABLE 6.—*Quantities purchasable by value of 1 acre.*

[For example, with the product of 1 acre of corn in 1899 a farmer could buy 56.4 gallons of coal oil; whereas in 1911, with the product of 1 acre of corn a farmer could buy 119.3 gallons of coal oil.]

	Corn.				Wheat.			
	1911	1910	1909	1899	1911	1910	1909	1899
Coal oil...gallons	119.3	102.4	105.8	56.4	88.4	94.5	107.2	48.3
Coffee...pounds	54.8	59.2	79.5	49.5	40.6	54.6	80.5	42.4
Flour...barrels	2.4	2.3	2.4	1.8	1.8	2.1	2.4	1.5
Lard...pounds	105.6	84.2	96.9	84.3	78.3	77.8	98.2	72.3
Salt...barrels	8.8	8.2	9.4	6.1	6.5	7.6	9.5	5.3
Soap...cakes	344.8	312.4	358.5	213.3	255.5	288.3	363.2	183.0
Starch...pounds	214.3	195.7	220.9	128.9	158.8	180.6	223.8	110.6
Sugar...do	219.1	231.5	259.0	159.7	162.4	213.6	262.4	137.0
Tobacco...do	33.0	30.0	34.4	21.1	24.5	27.7	34.9	18.1
Brooms	29.6	27.7	34.9	30.4	21.9	25.6	35.4	26.1
Dishpans	37.0	33.3	37.3	22.9	27.1	30.7	37.8	19.7
Dinner plates...sets	28.4	25.7	28.7	17.2	21.1	23.8	29.0	14.7
Fruit jars...dozen	18.5	17.0	19.2	11.7	13.7	15.7	19.4	10.0
Kitchen chairs	20.3	18.8	21.4	13.7	15.1	17.4	21.7	11.7
Lamps	30.1	27.6	31.2	18.5	22.3	25.5	31.6	15.9
Tin pails	60.4	54.3	61.6	37.0	44.7	50.1	62.4	31.7
Wooden buckets	42.5	40.3	46.9	32.0	31.5	37.2	47.6	27.4
Wooden washtubs	16.7	15.6	18.2	12.1	12.4	14.4	18.4	10.4
Gloves...pairs	17.0	15.6	17.8	11.9	12.6	14.4	18.0	10.2
Hats, felt	7.7	7.0	8.0	5.1	5.7	6.5	8.1	4.4
Jumpers	18.5	17.0	20.3	13.9	13.7	15.6	20.6	11.9
Overalls	16.9	15.7	18.6	13.0	12.5	14.5	18.9	11.1
Raincoats	3.6	3.3	3.8	2.6	2.7	3.0	3.8	2.2
Rubber boots...pairs	3.4	3.1	3.9	2.8	2.5	2.8	3.9	2.4
Shirts	10.1	9.2	10.4	7.0	7.5	8.5	10.6	6.0
Shoes...pairs	7.1	6.7	7.7	5.8	5.3	6.2	7.8	4.9
Calico	21.8	19.9	23.1	16.4	16.1	18.3	23.4	14.0
Muslin	15.7	14.2	16.7	11.8	11.7	13.1	16.9	10.1
Sheeting	7.7	6.9	8.3	6.0	5.7	6.3	8.4	5.1
Axes	14.9	13.4	15.0	9.3	11.0	12.4	15.2	8.0
Barb wire...pounds	481.8	422.5	475.3	287.5	357.0	389.8	481.6	246.6
Dung forks	19.5	17.7	20.7	13.0	14.4	16.4	20.9	11.2
Hatchets	23.9	21.5	24.4	15.1	17.7	19.8	24.7	13.0
Lanterns	18.8	16.1	17.3	10.4	13.9	14.9	17.5	8.9
Nails...pounds	480.2	425.2	476.8	285.6	355.8	392.3	483.2	245.0
Pitchforks	25.1	22.8	26.4	16.8	18.6	21.0	26.8	14.4
Pincers	29.3	26.1	29.5	17.7	21.7	24.1	29.8	15.2
Saws	17.4	15.7	17.8	10.9	12.9	14.4	18.0	9.3
Screw hooks...boxes	45.2	40.7	45.2	26.9	33.5	37.6	45.8	23.1
Screw eyes...do	46.1	41.5	46.4	27.5	34.1	38.3	47.0	23.5
Steel traps	54.4	48.5	54.4	34.6	40.3	44.8	55.1	29.7
Shovels	19.1	17.2	19.6	12.2	14.2	15.8	19.8	10.4
Staples...pounds	362.5	323.1	357.6	219.9	268.6	298.1	362.4	188.6
Steel wire...do	405.2	358.8	399.5	238.4	300.3	331.0	404.8	204.5
Wire fence...rods	44.4	39.6	44.3	26.6	32.9	36.5	44.9	22.8
Axle grease...boxes	145.0	131.8	150.2	88.6	107.5	121.6	152.2	76.0
Buggy whips	34.9	31.5	35.7	21.4	25.8	29.0	36.2	18.3
Corncutters	53.2	47.9	55.0	34.0	39.4	44.2	55.8	29.2
Churns	5.4	4.9	5.6	3.6	4.0	4.5	5.7	3.1
Halters	15.8	14.5	17.0	10.8	11.7	13.3	17.2	9.3
Horse blankets	7.2	6.7	7.6	4.8	5.3	6.1	7.7	4.1
Hoes	31.9	29.0	33.5	21.9	23.6	26.8	34.0	18.8
Picks	21.0	18.8	21.2	12.9	15.6	17.4	21.5	11.1
Scythes	14.5	13.0	15.0	9.9	10.7	12.0	15.2	8.5
Carbolic acid...pounds	41.1	37.6	42.9	28.4	30.4	34.7	43.5	24.3
Copperas...do	145.0	131.8	150.2	85.1	107.5	121.6	152.2	73.0
Lime...barrels	11.2	10.2	11.6	7.6	8.3	9.4	11.8	6.5
Paris green...pounds	49.3	43.6	49.2	31.5	36.5	40.3	49.9	27.0
Sulphur...do	172.0	156.6	176.7	100.1	127.4	144.5	179.1	85.9
Witch-hazel...pints	58.5	52.6	60.1	34.0	43.3	48.5	60.9	29.2
Baskets...½-bushel	38.9	35.4	41.0	30.5	28.8	32.7	41.6	26.2
Milk cans...10-gallon	5.5	4.9	5.6	3.3	4.0	4.5	5.7	2.9
Milk pails	29.6	26.7	30.2	18.8	21.9	24.6	30.6	16.1
Paints, ready-mixed...gallons	7.2	7.1	9.3	6.6	5.3	6.5	9.4	5.7
Paint brushes	18.7	17.0	19.7	12.5	13.9	15.7	19.9	10.8
Rope, hemp...pounds	116.5	102.4	110.4	68.6	86.3	94.5	111.9	58.9
Sacks	75.5	70.1	83.4	60.8	55.9	64.6	84.6	52.1
Scales	7.4	6.7	7.5	4.6	5.5	6.1	7.6	3.9
Twine...pounds	160.6	141.6	154.2	93.9	119.0	130.6	156.3	80.6

TABLE 6.—*Quantities purchased by value of 1 acre*—Continued.

	Cotton.				Average for all crops.			
	1911	1910	1909	1899	1911	1910	1909	1899
Coal oil......gallons..	163.9	194.8	155.4	88.3	124.8	119.2	112.6	62.7
Coffee......pounds..	75.3	112.5	116.7	77.6	57.3	68.9	84.6	55.1
Flour......barrels..	3.3	4.3	3.5	2.8	2.5	2.6	2.5	2.0
Lard......pounds..	145.1	160.3	142.3	132.1	110.6	98.1	103.2	93.8
Salt......barrels..	12.1	15.6	13.8	9.6	9.2	9.6	10.0	6.8
Soap......cakes..	473.7	594.4	526.5	334.3	360.8	363.8	381.6	237.3
Starch......pounds..	294.5	372.4	324.4	202.1	224.3	227.9	235.1	143.5
Sugar......do....	301.0	440.3	380.3	250.3	229.3	269.6	275.7	177.7
Tobacco......do....	45.5	57.0	50.6	33.1	34.6	34.9	36.7	23.5
Brooms......	40.6	52.8	51.3	47.6	31.0	32.3	37.2	33.8
Dish pans......	50.8	63.3	54.7	36.0	38.7	38.8	39.7	25.5
Dinner plates......sets..	39.1	49.0	42.1	26.9	29.8	30.0	30.5	19.1
Fruit jars......dozen..	25.4	32.3	28.1	18.3	19.4	19.8	20.4	13.0
Kitchen chairs......	28.1	35.8	31.4	21.4	21.3	21.9	22.7	15.2
Lamps......	41.4	52.5	45.8	29.0	31.5	32.2	33.2	20.6
Tin pails......	82.9	103.3	90.4	58.0	63.2	63.3	65.5	41.2
Wooden buckets......	58.4	76.7	68.9	50.2	44.5	47.0	50.0	35.6
Wooden washtubs......	22.9	29.7	26.7	18.9	17.5	18.2	19.4	13.5
Gloves......pairs..	23.3	29.6	26.1	18.6	17.8	18.1	18.9	13.2
Hats, felt......	10.6	13.3	11.7	8.0	8.1	8.2	8.5	5.7
Jumpers......	25.5	32.3	29.8	21.7	19.4	19.7	21.6	15.4
Overalls......	23.2	29.9	27.4	20.3	17.7	18.3	19.8	14.4
Raincoats......	5.0	6.3	5.6	4.0	3.8	3.8	4.0	2.9
Rubber boots......pairs..	4.6	6.0	5.7	4.4	3.6	3.6	4.1	3.1
Shirts, flannel......	13.9	17.5	15.3	11.0	10.6	10.7	11.1	7.8
Shoes, brogan......pairs..	9.8	12.7	11.4	9.0	7.5	7.8	8.2	6.4
Calico......	29.9	37.8	33.9	25.7	22.8	23.1	24.6	18.2
Muslin......	21.6	26.9	24.5	18.5	16.5	16.5	17.8	13.2
Sheeting......	10.5	13.1	12.1	9.3	8.0	8.0	8.8	6.6
Axes......	20.4	25.5	22.0	14.6	15.6	15.6	15.9	10.4
Barb wire......pounds..	661.9	803.8	698.1	450.7	504.2	492.1	506.0	319.9
Dung forks......	26.8	33.7	30.3	20.4	20.4	20.6	22.0	14.5
Hatchets......	32.9	40.9	35.8	23.7	25.0	25.0	26.0	16.9
Lanterns......	25.8	30.7	25.4	16.3	19.7	18.8	18.4	11.6
Nails......pounds..	659.7	808.9	700.3	447.7	502.6	495.2	507.6	317.8
Pitchforks......	34.5	43.4	38.8	26.3	26.3	26.5	28.2	18.6
Pincers......	40.2	49.7	43.3	27.8	30.7	30.5	31.4	19.7
Saws, buck......	23.8	29.8	26.1	17.1	18.2	18.2	18.9	12.1
Screw hooks......boxes..	62.1	77.4	66.4	42.2	47.3	47.4	48.2	30.0
Screw eyes......do....	63.3	78.9	68.1	43.0	48.2	48.3	49.4	30.5
Steel traps......	74.7	92.4	79.9	54.2	56.9	56.6	57.9	38.5
Shovels......	26.3	32.6	28.7	19.1	20.0	20.0	20.8	13.5
Staples......pounds..	498.0	614.6	525.2	344.7	379.4	376.2	380.7	244.7
Steel wire......do....	556.7	682.5	586.7	373.7	424.1	417.8	425.3	265.3
Wire fence......rods..	61.0	75.3	65.1	41.7	46.5	46.1	47.2	29.6
Axle grease......boxes..	199.2	250.7	220.6	139.0	151.8	153.5	159.9	98.6
Buggy whips......	47.9	59.9	52.4	33.5	36.5	36.6	38.0	23.8
Corncutters......	73.1	91.1	80.8	53.4	55.7	55.8	58.6	37.9
Churns......	7.5	9.4	8.2	5.6	5.7	5.7	5.9	4.0
Halters......	21.7	27.5	24.9	16.9	16.6	16.8	18.1	12.0
Horse blankets......	9.9	12.7	11.1	7.5	7.5	7.8	8.1	5.4
Hoes......	43.8	55.2	49.2	34.4	33.4	33.8	35.7	24.4
Picks......	28.9	35.8	31.2	20.2	22.0	21.9	22.6	14.3
Scythes......	19.9	24.8	22.1	15.5	15.2	15.2	16.0	11.0
Carbolic acid......pounds..	56.4	71.5	63.0	44.5	43.0	43.8	45.7	31.6
Copperas......do....	199.2	250.7	220.6	133.4	151.8	153.5	159.9	94.7
Lime......barrels..	15.4	19.5	17.1	11.9	11.7	11.9	12.4	8.5
Paris green......pounds..	67.7	83.0	72.3	49.4	51.6	50.8	52.4	35.1
Sulphur......do....	236.3	297.9	259.5	156.9	180.0	182.4	188.1	111.4
Witch-hazel......pints..	80.3	100.1	88.2	53.4	61.2	61.3	64.0	37.9
Baskets......½-bushel..	53.5	67.3	60.3	47.8	40.7	41.2	43.7	33.9
Milk cans......10-gallon..	7.5	9.4	8.2	5.2	5.7	5.7	6.0	3.7
Milk pails......	40.6	50.7	44.4	29.4	31.0	31.1	32.2	20.9
Paints, ready-mixed......gallons..	9.9	13.5	13.6	10.3	7.6	8.2	9.9	7.3
Paint brushes......	25.7	32.4	28.9	19.6	19.6	19.8	21.0	13.9
Rope, hemp......pounds..	160.0	194.8	162.2	107.6	121.9	119.2	117.6	76.4
Sacks......	103.7	133.3	122.6	95.3	79.0	81.6	88.8	67.6
Scales......	10.2	12.7	11.0	7.2	7.7	7.8	8.0	5.1
Twine......pounds..	220.6	269.4	226.5	147.2	168.1	164.9	164.2	104.5

Number of acres of corn, wheat, etc., which was required to buy the articles specified, in 1911, 1910, 1909, and 1899.

[Cost in acres of produce.]

	Corn.				Wheat.				Cotton.				Average for all crops.			
	1911	1910	1909	1899	1911	1910	1909	1899	1911	1910	1909	1899	1911	1910	1909	1899
Stove	1.9	2.1	1.8	2.9	2.6	2.3	1.8	3.4	1.4	1.1	1.2	1.9	1.8	1.8	1.7	2.6
Shotgun	.9	1.0	.9	1.7	1.2	1.1	.9	2.0	.7	.5	.6	1.1	.9	.9	.8	1.5
Buggy	5.1	5.5	4.8	7.8	6.8	6.0	4.7	9.0	3.7	2.9	3.3	4.9	4.8	4.8	4.5	7.0
Cream separator	4.6	5.3	4.8	9.2	6.2	5.7	4.7	10.8	3.4	2.8	3.2	5.9	4.4	4.5	4.5	8.3
Grindstone	.2	.3	.2	.4	.3	.3	.2	.4	.2	.1	.2	.2	.2	.2	.2	.3
Harness, single	1.0	1.1	1.0	1.5	1.4	1.2	1.0	1.7	.8	.6	.7	.9	1.0	1.0	.9	1.3
Harrow	.8	.9	.8	1.2	1.1	1.0	.8	1.4	.6	.5	.5	.8	.8	.8	.7	1.1
Manure spreader	6.8	7.8	6.9	11.8	9.2	8.4	6.8	13.8	5.0	4.1	4.7	7.5	6.5	6.7	6.5	10.6
Mower	3.2	3.6	3.1	5.4	4.4	3.9	3.1	6.3	2.4	1.9	2.1	3.4	3.1	3.1	3.0	4.9
Plow	.8	.9	.8	1.3	1.1	.9	.8	1.5	.6	.5	.5	.8	.8	.7	.7	1.1
Saddle	1.2	1.3	1.1	1.7	1.6	1.4	1.1	2.0	.8	.7	.8	1.1	1.1	1.1	1.0	1.5
Tedder	2.7	3.0	2.6	4.2	3.6	3.2	2.5	4.9	2.0	1.6	1.7	2.7	2.6	2.6	2.4	3.8
Wagon, single	3.4	3.7	3.2	5.2	4.6	4.0	3.1	6.1	2.5	1.9	2.2	3.3	3.2	3.1	3.0	4.7
Wagon, double	5.0	5.4	4.6	7.1	6.8	5.9	4.5	8.3	3.7	2.9	3.1	4.6	4.8	4.7	4.3	6.4

TABLE 7.—*Purchasing power of the produce of 1 acre in 1911 compared with the purchasing power of 1 acre in 1910, 1909, and 1899, respectively.*

[For example, in 1911 the product of 1 acre of corn could exchange for 17 per cent more coal oil than the product of 1 acre of corn in 1910, 13 per cent more than in 1909, and 112 per cent more than in 1899.]

	Purchasing power 1911, compared with years indicated, of 1 acre of—											
	Corn.			Wheat.			Cotton.			Average for all crops.		
	1910	1909	1899	1910	1909	1899	1910	1909	1899	1910	1909	1899
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Coal oil	117	113	212	94	82	183	84	105	186	105	111	199
Coffee	93	69	111	74	50	96	67	65	97	83	68	104
Flour	104	100	133	86	75	120	77	94	118	96	100	125
Lard	125	109	125	101	80	108	91	102	110	113	107	118
Salt	107	94	144	86	68	123	78	88	126	96	92	135
Soap	110	96	162	89	70	140	80	90	142	99	95	152
Starch	110	97	166	88	71	144	79	91	146	98	95	156
Sugar	95	85	137	76	62	119	68	79	120	85	83	129
Tobacco	110	96	156	88	70	135	80	90	137	99	94	147
Brooms	107	85	97	86	62	84	77	79	85	96	83	92
Dish pans	111	99	162	88	72	138	80	93	141	100	97	152
Dinner plates	111	99	165	89	73	144	80	93	145	99	98	156
Fruit jars	109	96	158	87	71	137	79	90	139	98	95	149
Kitchen chairs	108	95	148	87	70	129	78	89	131	97	94	140
Lamps	109	96	163	87	71	140	79	90	143	98	95	153
Tin pails	111	98	163	89	72	141	80	92	143	100	96	153
Wooden buckets	105	91	133	85	66	115	76	85	116	95	89	125
Wooden washtubs	107	92	138	86	67	119	77	86	121	96	90	130
Gloves	109	96	143	88	70	124	79	89	125	98	94	135
Hats	110	96	151	88	70	130	80	91	132	99	95	142
Jumpers	109	91	133	88	67	115	79	86	118	98	90	126
Overalls	108	91	130	86	66	113	78	85	114	97	89	123
Raincoats	109	05	138	90	71	123	79	89	125	100	95	131
Rubber boots	110	87	121	89	64	104	77	81	105	100	88	116
Shirts, flannel	110	97	144	88	71	125	79	91	126	99	95	136
Shoes	106	92	122	85	68	108	77	86	109	96	91	117
Calico	110	94	133	88	69	115	79	88	116	99	93	125
Muslin	111	94	133	89	69	116	80	88	117	100	93	125
Sheeting	112	93	128	90	68	112	80	87	113	100	91	121
Axes	111	99	160	89	72	138	80	93	140	100	98	150

TABLE 7.—*Purchasing power of the produce of 1 acre in 1911, etc.*—Continued.

	Purchasing power 1911, compared with years indicated, of 1 acre of—											
	Corn.			Wheat.			Cotton.			Average for all crops.		
	1910	1909	1899	1910	1909	1899	1910	1909	1899	1910	1909	1899
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Barb wire	114	101	168	92	74	145	82	95	147	102	100	158
Dung forks	110	94	150	88	69	129	80	88	131	99	93	141
Hatchets	111	98	158	89	72	136	80	92	139	100	96	148
Lanterns	117	109	181	93	79	156	84	102	158	105	107	170
Nails	113	101	168	91	74	145	82	94	147	101	99	158
Pitchforks	110	95	149	89	69	129	79	89	131	99	93	141
Pincers	112	99	166	90	73	143	81	93	145	101	98	156
Saws	111	98	160	90	72	139	80	91	139	100	96	150
Screw hooks	111	100	168	89	73	145	80	94	147	100	98	158
Screw eyes	111	99	168	89	73	145	80	93	147	100	98	158
Steel traps	112	100	157	90	73	136	81	93	138	101	98	148
Shovels	111	97	157	90	72	137	81	92	138	100	96	148
Staples	112	101	165	90	74	142	81	95	144	101	100	155
Steel wire	113	101	170	91	74	147	82	95	149	102	100	160
Wire, fence	112	100	167	90	73	144	81	94	146	101	99	157
Axle grease	110	97	164	88	71	141	79	90	143	99	95	154
Buggy whips	111	98	163	89	71	141	80	91	143	100	96	153
Corn cutters	111	97	156	89	71	135	80	90	137	100	95	147
Churns	110	96	150	89	70	129	80	91	134	100	97	142
Halters	109	93	146	88	68	126	79	87	128	99	92	138
Horse blankets	107	95	150	87	69	129	78	89	132	96	93	139
Hoes	110	95	146	88	69	126	79	89	127	99	94	137
Picks	112	99	163	90	73	141	81	93	143	100	97	154
Scythes	112	97	146	89	70	126	80	90	128	100	95	138
Carbolic acid	109	96	145	88	70	125	79	90	127	98	94	136
Copperas	110	97	170	88	71	147	79	90	149	99	95	160
Lime	110	97	147	88	70	128	79	90	129	98	94	138
Paris green	113	100	157	91	73	135	82	94	137	102	98	147
Sulphur	110	97	172	88	71	148	79	91	151	99	96	162
Witch-hazel	111	97	172	89	71	148	80	91	150	100	96	161
Baskets	110	95	128	88	69	110	79	89	112	99	93	120
Milk cans	112	98	167	89	70	138	80	91	144	100	95	154
Milk pails	111	98	157	89	72	136	80	91	138	100	96	148
Paints	101	77	109	82	56	93	73	73	96	93	77	104
Paint brushes	110	95	150	89	70	129	79	89	131	99	93	141
Rope	114	106	170	91	77	147	82	99	149	102	104	160
Sacks	108	91	124	87	66	107	78	85	109	97	89	117
Scales	110	99	161	90	72	141	80	93	142	99	96	151
Twine	113	104	171	91	76	148	82	97	150	102	102	161
Stoves	109	94	151	87	69	130	78	88	132	98	93	142
Shotguns	111	99	190	90	72	164	82	92	168	100	97	178
Buggies	109	95	153	88	69	132	79	89	135	99	93	144
Cream separators	114	103	200	92	75	173	82	96	175	102	101	188
Grindstones	108	96	150	91	69	131	82	88	135	100	91	143
Harness	113	98	145	87	69	120	78	88	122	97	92	130
Harrows	110	96	150	88	71	131	80	92	134	99	95	142
Manure spreaders	113	101	173	91	74	149	82	94	152	102	99	163
Mowers	111	97	167	89	71	144	80	91	146	100	95	157
Plows	110	96	159	88	70	137	79	90	140	97	95	150
Saddles	109	94	146	87	69	127	79	88	128	98	94	138
Tedders	110	95	156	88	69	135	80	88	137	99	93	147
Wagons, single	108	93	155	87	68	134	78	87	135	98	92	146
Wagons, double	108	91	142	87	67	123	78	85	124	97	89	133

REPORT OF THE LIBRARIAN.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE LIBRARIAN,
Washington, D. C., October 29, 1912.

SIR: I have the honor to submit herewith the executive report of the Library for the fiscal year ended June 30, 1912.

Respectfully,

CLARIBEL R. BARNETT,
Librarian.

Hon. JAMES WILSON,
Secretary of Agriculture.

GENERAL.

The statistics given in the following pages will, it is believed, indicate a satisfactory growth of the Library during the past year. The staff has rendered faithful and efficient service, the number of accessions was greater than in any previous year, and the usefulness of the Library has been extended. On account of the pressure of the routine work, no new work has been attempted with the exception of the inventory. On January 19 of the present year the Secretary appointed a departmental library committee, composed of Dr. N. A. Cobb, of the Bureau of Plant Industry, chairman, and Dr. E. W. Allen, of the Office of Experiment Stations, and Dr. Albert Hassall, of the Bureau of Animal Industry, associates, to cooperate with the Librarian in carrying out the recommendations of the Departmental Committee on Economy and Efficiency in regard to the libraries of the department. The first question dealt with by the committee was the question of whether or not it would be advisable to transfer to the Library of Congress, on account of lack of space, the files of the less-used agricultural journals. Lists of the agricultural periodicals contained in the Library were accordingly sent to a large number of the scientists of the department with the request that they check the periodicals which they would wish to have retained in this Library. The results of the inquiry indicated conclusively that it would not be wise to transfer to the Library of Congress any of the files of agricultural periodicals. Their retention in the Library has, therefore, been approved. It was gratifying to learn from the expressions of opinion on the general policy of the Library called forth by the above inquiry that there is a strong sentiment on the part of many of the scientists in favor of the present policy of making the Library's collections not merely working collections, but as complete as possible in the subjects pertaining to the work of the department.

Meetings of the Library staff, comprising all engaged in library work in the department, were held each month from October, 1911, to June, 1912. These meetings have been instructive, and helpful not only in improving the library service, but also in promoting an esprit de corps. The loyalty and hearty cooperation of the staff in carrying on the work of the Library is gratefully acknowledged. It is a pleasure to report that there were few changes in the staff during the past year.

The Librarian and two other members of the staff attended the conference of the American Library Association at Ottawa June 26 to July 3, 1912. The first meeting of the new Agricultural Libraries Section of the Association was held in connection with this conference, which made it of more than usual interest to this Library. The section was especially fortunate in having addresses from the Hon. Martin Burrell, Minister of Agriculture for Canada, and Dr. James W. Robertson, of the Canadian Commission on Conservation.

FINANCES.

In view of the fact that detailed statements on the expenditures of the Library are given in the various financial reports of the department, they have not been included in the Library reports, but to gain an adequate idea of the work of the Library some statement of its expenditures is necessary. It is believed, therefore, that the following report will be better understood for including here a summarized statement of the expenditures of the Library for the past three years.

Expenses of the Library.

Object of expenditure.	Fiscal year 1910.	Fiscal year 1911.	Fiscal year 1912.
	Dollars.	*Dollars.*	*Dollars.*
Books and serials	10,278.45	8,832.82	[1]7,257.44
Periodicals	3,281.41	3,192.01	[1]3,690.00
Index cards	191.77	224.44	[1]146.89
Printing	3,982.35	3,676.34	3,307.54
Binding	6,175.26	8,744.38	9,506.41
Salaries (main Library)	20,151.99	21,576.16	27,848.17
Supplies and repairs	263.26	112.97	150.32
Furniture and miscellaneous equipment	1,465.95	1,247.96	1,000.20
Traveling expenses	68.63	30.50	97.98
Total	45,859.07	47,637.58	53,004.95

[1] Approximate figures.

It will be seen from the above table that the expenditures for books for the past two years have been considerably less than in the year 1910. This is due to the fact that it was necessary on account of the increase in the routine work of the Library to spend a larger proportion of the Library's appropriation for salaries. It is hoped that a larger appropriation for books will be available in the near future.

ROOMS.

On account of the growth of the collections it was necessary to provide considerable additional shelving during the past year. Since all the wall and stack space in the rooms occupied by the Library had been used, the only space available for shelving was the corridor. Five additional wooden bookcases in imitation mahogany to harmonize with the old mahogany cases now in the corridor were accordingly ordered for the main corridor. They provide approximately 465 feet of shelving. They are used to hold the part of the collection of Government documents which was formerly shelved in a room made by partitioning off the south end of the south corridor, which space was recently allotted to the Office of Nutrition Investigations. The collection of Government documents is now all shelved in the cases in the main corridor. A few sections of these cases were made in closed cupboard form to provide shelving for the largest folios, which on account of their size and shape need to lie flat. In addition, four large oak cases with doors were ordered for the folios of medium size, which it was necessary to move from the room adjoining the reference room in order to provide more space for the reference books. The new cases for the folios are placed along the walls in the south corridor. The folios are now more convenient for consultation than they have been heretofore, as the provision for shelving them has in the past been most inadequate.

The growth of the catalogue necessitated two additional 60-drawer catalogue cases. Since the reference room was already crowded, it was impossible to provide space for the new cases without rearranging the room. Two of the double-faced oak bookcases extending out into the room were accordingly removed and a wall case provided in place of them, which left sufficient space at the side of the room to arrange the eight catalogue cases in a double row back to back. The appearance of the room has been improved by the new arrangement and the catalogue is more convenient to consult, but there is less shelf space for the reference books. It was therefore necessary, as mentioned above, to move part of them to the adjoining room, space for them having been provided by the removal of the folios to the corridor.

Attention has been called in previous reports to the disadvantages under which the Library is laboring from lack of space, both for the shelving of books and for workrooms. The need for additional shelf room is now imperative and must be met during the next few months if the Library is to be kept in an orderly condition. It is earnestly hoped that conditions will be greatly improved in the coming year.

LIBRARY PUBLICATIONS.

The Library publications of the year included the Report of the Librarian for 1911, a pamphlet of 31 pages, which was issued in December, 1911, and the Monthly Bulletin of the Library, the numbers for July, 1911, to June, 1912, comprising 385 pages, exclusive of the author index, which, it is regretted, was not published in the past fiscal year on account of lack of printing funds. The number of pages contained in the numbers of the Monthly Bulletin for July, 1910, to June, 1911, exclusive of the index, was 352 pages, as compared with 385 pages for the present fiscal year. This increase is further evidence of the increased annual rate of growth of the Library's resources. The publication of the Catalogue of the publications relating to forestry in the library of the Department, which it was hoped would appear in the past fiscal year, was also delayed from lack of printing funds.

USE OF THE LIBRARY.

During the past year the charges recorded at the loan desk of the main Library numbered 38,112, an increase of 1,862 compared with the previous year. The record of similar charges for the past five years is as follows:

Number of books borrowed from the main Library[1] for the fiscal years 1908 to 1912.

Month.	Fiscal year.				
	1907–8	1908–9	1909–10	1910–11	1911–12
July	1,375	1,642	2,490	2,357	2,397
August	1,446	1,455	2,334	2,381	2,425
September	1,270	1,893	2,540	2,259	2,517
October	1,789	2,714	2,610	3,118	3,404
November	2,051	2,406	3,567	3,083	3,465
December	1,918	2,682	3,315	2,952	2,962
January	2,621	3,061	3,364	3,535	4,094
February	2,380	2,798	3,221	3,340	3,851
March	1,969	3,000	3,310	3,668	3,614
April	1,669	3,169	2,804	3,805	3,415
May	1,981	2,913	2,708	2,589	3,208
June	2,001	2,873	2,917	3,163	2,760
Total	22,470	30,606	35,180	36,250	38,112

[1] These figures represent the number of books taken from the main Library for use in the offices of the department.

The above statistics indicate only in part the extent to which the Library was used. The figures do not include (1) a record of the circulation of single unbound numbers; (2) a record of the use of the books deposited in the various bureaus; (3) a record of the books used in the Library. The figures are merely a record of the number of books charged at the loan desk of the main Library and include not only the charges for books belonging to this Library, but also the charges for books borrowed from other libraries. The records of the bureau and division libraries, in so far as they have been kept, have in the following table been combined with the records of the main Library, and represent the total number of books and periodicals charged in the main Library and the bureau and division libraries.

Number of books and periodicals charged by the main Library and the bureau and division libraries[1] in the fiscal year 1912.

	Books.	Current numbers of periodicals.
Main Library	38,112	[2] 70,000
Bureau of Chemistry library	11,674	19,507
Bureau of Entomology library	2,021	500
Forest Service library	3,131	1,600
Bureau of Plant Industry library	14,474	26,576
Dairy Division	1,243	[2] 10,700
Total	70,655	128,883

[1] No statistics of the circulation of books and periodicals have been kept in the libraries of the Bureau of Statistics, Bureau of Biological Survey, Office of Public Roads, and Office of Experiment Stations.

[2] Approximate figures.

The Bureau of Animal Industry and the Bureau of Soils do not maintain libraries, as their offices are in close proximity to the main Library.

The above figures, as kept from year to year, show the increase in the work of the loan desks, but do not accurately represent the actual use of the books. In order that the records of charges might represent with a greater degree of accuracy the actual use of the books, the statistics of the loans have been kept in more detail since the 1st of January, 1912, the charges to individuals having been kept separate from the charges to libraries. The sum total of the books charged to individuals by the main Library and the bureau and division and office libraries represents the number of books borrowed for use by individuals; the remaining charges represent merely the record of the books shifted from one branch of the Library to another either for filing or to fill the request of some reader. In the latter case the record of its use by the individual is kept among the charges to individuals. In the following table giving the statistics for the six months January to June, 1912, only the charges to individuals have been included, the charges to libraries (including the main Library and the bureau and division libraries) having been eliminated. The number of charges to individuals gives a more accurate idea of the actual use of the books than it has been possible to give in the past, but they can only be regarded as an approximate statement by no means representing the full use of the Library.

Number of books borrowed by individuals from the main Library and the bureau, division, and office libraries for the period January to June, 1912.

Main Library	9,091
Bureau of Chemistry library	4,376
Bureau of Entomology library	1,971
Forest Service library	1,801
Bureau of Plant Industry library	7,259
Dairy Division library	1,183
Total	25,681

As the use of the Library during the six months, July to December, 1911, was probably about the same as during the six months January to June, 1912, the circulation of books to individuals for the whol fiscal year may be given as approximately 51,000.

INTERLIBRARY LOANS.

The number of books borrowed from other libraries during the past year was 6,405, of which number 61 were borrowed from libraries outside of Washington and 6,344 from Washington libraries. The names of the libraries outside of the city from which books were borrowed and the number of books borrowed were as follows:

Arnold Arboretum, Jamaica Plain, Mass	3
Boston Public Library, Boston, Mass	1
Boston Society of Natural History Library	1
Columbia University Library, New York	3
Gray Herbarium Library, Cambridge, Mass	5
Harvard University Library, Cambridge, Mass	1
John Donnell Smith Library, Baltimore, Md	2
John Crerar Library, Chicago, Ill	8
Johns Hopkins University Library	4
Lloyd Library, Cincinnati, Ohio	2
Massachusetts Horticultural Society Library, Boston	4
Missouri Botanical Garden Library, St. Louis, Mo	14
Museum of Comparative Zoology Library, Cambridge	9
New York Botanic Garden	1
University of Pennsylvania Library, Philadelphia	1
Yale University Library, New Haven	2
Total	61

As regards Washington libraries, the most frequent demands were made upon the Library of Congress and the library of the Surgeon General's office. To all the libraries in and out of the city which have aided the department in its investigations by the loan of material especial thanks are due.

The number of books lent by this Library during the past year to libraries and scientists outside of the city was 620, an increase of 7 as compared with the previous year. The statistics for the past five years, arranged geographically, are as follows:

Record of books lent outside of Washington during the fiscal years 1908–1912.

States, etc.	Fiscal year.					States, etc.	Fiscal year.				
	1907–8	1908–9	1909–10	1910–11	1911–12		1907–8	1908–9	1909–10	1910–11	1911–12
Alabama	1	......	......	8	......	New Jersey	......	3	2	1	......
Alaska	2	......	......	......	......	New York	55	53	91	70	79
Arizona	18	13	11	5	8	North Carolina	24	18	38	38	25
Arkansas	1	......	......	2	1	North Dakota	3	......	2	18	4
California	6	1	10	8	15	Ohio	4	17	13	29	37
Colorado	2	7	4	7	15	Oregon	9	1	24	38	36
Connecticut	15	10	41	11	12	Pennsylvania	18	33	4	3	27
Delaware	1	......	......	5	8	Rhode Island	......	......	1	......	......
Florida	56	81	54	36	38	South Carolina	......	3	......	1	2
Georgia	1	1	7	4	7	South Dakota	......	......	......	1	2
Illinois	9	11	16	11	2	Tennessee	5	3	9	13	9
Indiana	7	2	2	15	23	Texas	4	1	12	13	12
Iowa	......	2	6	13	9	Vermont	4	16	14	8	......
Kansas	1	1	2	2	18	Virginia	13	28	28	15	50
Kentucky	......	......	3	11	2	Washington	9	1	6	......	13
Louisiana	8	12	13	2	......	West Virginia	......	......	2	1	14
Maine	7	17	9	25	4	Wisconsin	13	9	4	37	32
Maryland	16	12	8	8	9	Wyoming	......	1	6	7	......
Massachusetts	35	3	8	17	10	Canada	......	1	......	1	11
Michigan	4	7	8	6	20	Hawaii	11	14	3	7	1
Minnesota	11	9	8	5	5	Jamaica	......	1	......	......	......
Mississippi	......	2	1	8	3	Japan	......	......	......	1	......
Missouri	7	4	4	1	5	Mexico	......	......	1	2	......
Montana	......	1	3	2	2	Porto Rico	1	2	52	55	33
Nebraska	6	12	18	41	17						
Nevada	......	......	......	......	......	Total	391	416	548	613	620
New Hampshire	4	3	......	1	......						

All but a very small percentage of the above books were lent to the State agricultural colleges and experiment stations.

In addition, a number of copies, either typewritten or photographic, of articles in periodicals, were supplied in cases where the volumes could not conveniently be sent.

ACCESSIONS.

The number of books, pamphlets, and maps added to the Library during the past year, compared with the accessions of the two previous years, is as follows:

Accessions to the Library for the years 1910, 1911, and 1912.

Accessions.	Fiscal year—		
	1910	1911	1912
Purchases:			
Volumes	1,454	2,030	1,552
Pamphlets	65	89	77
Maps	8	1	0
Photographs	0	0	10
Serials and continuations	1,574	736	522
	3,101	2,856	2,161
Gifts:			
Volumes	488	614	907
Pamphlets	387	502	756
Maps	43	12	20
Continuations	2,728	3,463	3,560
	3,646	4,591	5,243
From binding periodicals and serials.	1,409	1,369	1,718
Total	8,156	8,816	9,122

The above tables show that the accessions of the past year, namely, 9,122, all of which were catalogued, exceeded those of the previous year by 306. The total recorded number of books, pamphlets, and maps in the Library on July 1, 1912, was 122,043. In addition, the Library had on hand on July 1, 1912, unaccessioned, uncatalogued, and unclassified material as follows: Volumes 96, pamphlets, 344; continuations, 269; maps, 13; total, 722.

An analysis of the above statistics of the total increase in the accessions to the Library shows that while the number received by gift during the past year, namely, 5,243, exceeded the number for the previous year by 652. the number by purchase, namely, 2,161, was 695 less than the year 1911, and 940 less than the year 1910. This is explained by the fact that the funds available for the purchase of books and periodicals were $1,445.63 less in 1911 than in 1910, and $1,575.38 less in 1912 than in 1911, as shown by the statement of the finances of the Library given earlier in the report. This fact is much regretted, as the work of the department is constantly expanding, necessitating a corresponding increase in funds for the purchase of books and periodicals if the Library is to keep pace with the demands of the work. In view of this decrease in the accessions by purchase, the large percentage of increase in the accessions by gift is especially gratifying and shows the results of a more systematic effort which has been made by the Library during the past few years to obtain material of this kind, a large part of which is invaluable in the investigations of the department. It is regretted that it is impracticable from lack of space to include in the reports of the Library a record of the donors who have generously contributed to the resources of the Library and to whom the thanks of the department are due.

On account of the decrease in the funds available for the purchase of books, little progress was made during the past year in completing files of periodicals. The only important sets completed were the following:

Beihefte zum Botanischen centralblatt.
Deutsche fleischbeschauer-zeitung.
Entomologiske meddelelser.
Germany-Reichsamt des innern. Berichte über handel und industrie.
Schweizerische botanische gesellschaft. Berichte.

At the beginning of the past year, the Library began to reap the benefit of the recent copyright legislation (sec. 59, new copyright law), which permits the Library of Congress to transfer to Government libraries, if not needed in the Library of Congress, one of the two copies of every volume copyrighted in the United States which are, according to the copyright law, sent to the Library of Congress. The Library has accordingly during the past year been selecting from the copyright material available for transfer to Government libraries such items as were of interest in this Library. The number of books and pamphlets received during the year was 293. These are included in the record of gifts to the Library noted above. It is interesting, historically, to note in this connection that the Report of the Secretary of Agriculture for the year 1893, in the paragraph on the Department library (p. 38), contains the following suggestion:

> Two copies of every volume copyrighted in the United States are, under existing law, placed with the Librarian of Congress. Therefore he has duplicates of each work upon agriculture thus far copyrighted in the United States. It is suggested that Congress enact that its librarian transfer to the library of this department one copy of each of the works bearing upon agriculture, horticulture, forestry, pomology, botany, and kindred topics now in his possession or that may come into his hands hereafter under copyright law. This would, without additional cost to the Government, and much to the depletion of the present inutility of duplicate books in the Congressional Library, add a great many valuable volumes to the agricultural literature of this Department.

CATALOGUING.

There were catalogued during the past year 2,459 volumes, 833 pamphlets, 5,800 continuations, 10 photographs, and 20 maps, making a total of 9,122, an increase of 306 over the previous year. There were added to the main (dictionary) catalogue 30,138 cards and 3,361 were withdrawn, making the net addition 26,777, an increase of 7,525 as compared with the previous year. It is estimated that the main dictionary catalogue now contains approximately 286,000 cards.

The number of titles prepared during the fiscal year by the Library for printing by the Library of Congress in what is known as the "Agr" series, compared with the previous year, was as follows:

	1911.	1912.
Cards for accessions and recatalogued books	1,557	1,872
Cards for department publications	355	449
Cards for foreign agricultural periodicals	68	61
Total	1,980	2,382

The total number of titles prepared by this Library since 1902, in which year the printing of cards was begun, is 20,483. For the benefit of other agricultural libraries, there is given as an appendix to this report a complete list of the series for which this Library prepares cards for printing by the Library of Congress. The number of new titles added to the list in the past year was 23.

It is gratifying to be able to report that the amount of uncatalogued material on hand on July 1, 1912, was much less than in the two previous years. The number of uncatalogued books and pamphlets on hand on July 1. 1910 was 1,739; on July 1, 1911, 1,984; on July 1, 1912, 722.

The separate collection of pamphlets kept in pamphlet boxes, arranged by subject and represented in the catalogue only by temporary author cards with abbreviated imprint, was considerably increased during the year, 597 pamphlets having been catalogued and added to the collection, which now numbers 2,086. This method of cataloguing the less important pamphlets has proved fairly satisfactory and has resulted in a considerable saving of time.

In previous reports attention has been called to the need for a revision of the catalogue. Before beginning the revision it was deemed advisable to consider in general not only the catalogues and cataloguing of the main Library, but also of the Bureau libraries. The librarian accordingly appointed a cataloguing committee, composed of the assistant in charge of the cataloguing in the main Library and representatives from the libraries of the Bureau of Chemistry, Bureau of Entomology, Forest Service, and Bureau of Plant Industry, to consider the general subject of cataloguing and indexing in the department. The committee held several meetings during April, May, and June. A report of their work was presented at the June staff meeting. In addition to making certain definite recommendations for the improvement of the main Library catalogue, which recommendations can probably be carried out without a great expenditure of time, the committee also made other recommendations in the line of cooperation which will, it is believed, be a step toward coordinating the work of cataloguing and indexing in the Department and toward rendering the work now being done in the various libraries more generally available. It is hoped that it will be possible during the coming year to devote considerable time to the revision of the catalogue. In the meantime it is a decided advantage to have settled for the time being certain vexed questions in regard to the catalogue and to have decided on a general policy in connection with the work.

BIBLIOGRAPHICAL WORK.

The only bibliographical work done by the main Library during the year was the completion of the Catalogue of publications relating to forestry contained in the Department Library (Library Bulletin No. 76), which was prepared in cooperation with the Forest Service. Considerable bibliographical work has, however, been done by the Bureau libraries. The bibliography on the White Mountain and Appalachian Regions, begun in the spring of 1911 by the Librarian of the Forest Service, was completed and printed in the Proceedings of the Society of American Foresters in the fall of 1911. It contained about 2,000 references. In addition, the librarian of the Forest Service compiled during the past year a bibliography of about 1,000 references on forest influences, to accompany Appendix 5 of the Final Report of the National Waterways Commission. The monthly list of current forestry literature prepared for some time by the library of the Forest Service and printed each month in the periodical "American Forestry" has also been continued.

The library of the Bureau of Chemistry has in preparation a bibliography of articles on the various food preservatives, including their use in experiments on animals and their effects on the human system, and also has been gathering references on the presence of various metallic substances occurring naturally in food materials, the amounts found in different foods and their physiological effects on the human system.

The librarian of the Bureau of Entomology is preparing a list of the bibliographies on insects contained in the Bureau of Entomology publications.

The most important bibliographical lists compiled by the Bureau of Plant Industry during the year were an annotated list of all the books and pamphlets relating to sugar beets contained in the Library, and an approximately complete list of American and foreign methods of frost protection, including the references on the subject found in the Library catalogue and the Experiment Station Record.

In addition to preparing bibliographical lists, the librarians of certain of the Bureaus and Divisions have been called upon to verify and edit the bibliographies and lists of references prepared by the scientists in connection with their investigations. The library of the Bureau of Plant Industry during the year verified 18 such bibliographies, comprising 1,474 references, for inclusion in Bureau bulletins. Bibliographies and references for 10 Dairy Division publications were verified and put in form during the year by the librarian of the Dairy Division. The large number of such lists contained in publications of the Department and their importance has emphasized the desirability of uniformity. A bibliographical committee composed of the Assistant Librarian and representatives from three of the Bureau libraries was therefore appointed by the Librarian some months ago to compile a tentative list of rules to be followed in citations and bibliographical lists contained in Department publications. The committee has done considerable work on the rules and it is hoped will be able to have them in form during the coming year for consideration by the editorial staff of the Department.

PERIODICALS.

The periodicals currently received during the year numbered 1,948 different titles, exclusive of annuals and other serials of infrequent issue, a decrease of 30 as compared with the previous year. This decrease is explained by the fact that the number of new titles added during the year was 80, whereas the number of periodicals which ceased publication or were discontinued was 110. Of the total number of periodicals received, 720 were purchased and 1,228 received by gift and exchange. To the number of different periodicals purchased should be added 73 duplicates, making a total of 793 periodicals purchased. The circulation of the current periodicals described in some detail in the last report has been continued with little change. There has not been as great an improvement in the prompt use and return of periodicals as it was hoped there would be as a result of the special efforts which were made at the close of the past fiscal year to improve this service, but the fact that conditions have become no worse have made it possible to continue the service. The circulation of current periodicals is, however, one of the Library's problems which can not yet be regarded as satisfactorily settled.

The statistics of the accessions to the Library given in one of the previous paragraphs show the large increase in the number of continuations annually received by the Library by gift. This is largely the result of the efforts of the periodical division and has involved a great amount of correspondence and much searching for out-of-way material. The Library's connection with the distribution of the publications of the department to foreign periodicals, societies, and institutions has been used to advantage in obtaining many valuable exchanges. During the past year a new and improved form of continuation slip was adopted, and a beginning was made in recopying the continuation catalogue. The additional information contained on the new slips will, it is believed, be a decided advantage in systematizing the work in connection with periodicals and serials and make the continuation catalogue a still more valuable record. The number of annual reports and other serials of infrequent issue received in the past year was 3,560, in addition to the 1,948 current periodicals.

BINDING.

It is gratifying to be able to report that the number of books and periodicals sent to the bindery during the past year was 3,930, an increase of 656 over the previous year. In addition, 1,377 volumes were put in temporary binders, making a total of 5,307 volumes bound. If the rate of increase of the past year in the number of volumes bound can be continued, it will probably be possible in a few years to bring the binding approximately up to date.

DUPLICATES.

The Library continues to receive a large number of duplicates, for the most part Government, State, and society publications which are sent to various offices of the department and later transferred to the Library. It was hoped that it would be possible to print during the past year a list of the duplicates on hand, similar to the list printed in October, 1910, but the illness of the assistant in charge of the work has delayed the preparation of the list. The list is now in preparation and will be distributed to the agricultural colleges and experiment stations in the near future. Lack of suitable space for the sorting of the duplicates and for their temporary storage continues to hamper the work.

INVENTORY.

During the past year the Library began the work of taking an inventory of the Library which was recommended by the Department Committee on Economy and Efficiency. As far as is known, no inventory of the Library has ever been taken. It will therefore involve a great amount of work and can not probably be finished under two years. The Library has realized the desirability of taking an inventory, but has deemed it advisable to devote its energies first to the completion of the catalogue of the Library. While the Library is not yet completely catalogued, the remaining back cataloguing is proportionately small and can be carried on along with the work of the inventory.

TRANSLATING.

During the past year 350 letters in foreign languages were referred to the Library for translation by the Library translator. In addition, 17 articles, comprising 73 pages, were translated.

MAILING LISTS AND EXCHANGES.

In the report for last year the work of the Library in connection with the mailing lists for Department publications was described somewhat in detail. The work has been continued along the same lines therein described, with only a few minor changes. Certain parts of the work which were formerly attended to by the Library have been transferred to the Division of Publications in order to carry out more consistently the general policy recommended by the Department Committee on Economy and Efficiency of confining the work of the Library in connection with the distribution of the department publications to the supervision of foreign mailing lists and the domestic "libraries list," and to the distribution of the publications to foreign institutions, societies, officials connected with agriculture, and exchanges. In other words, the Library has been relieved of that part of the work which does not especially belong to or concern it and has been continued in charge of those parts of the work which are of value in obtaining exchanges. The cooperation of the Division of Publications with the Library in the matter of obtaining exchanges has been especially helpful.

BUREAU, DIVISION, AND OFFICE LIBRARIES.

In the report of the Library for the previous fiscal year was included a general description of the organization and administration of the various bureau, division, and office libraries, and also somewhat detailed reports from the various libraries. As their work has been carried on along the same lines during the past year and since there are no new undertakings or changes of special importance to report, it seemed best to omit the separate detailed reports for the present year and to incorporate the statistics of the use of these branch libraries with those of the main Library. The bibliographical work carried on in the Bureau and Division libraries has been described above in the paragraph on bibliographical work. There is frequent evidence of the fact that the service of the Library is being improved through the increased cooperation between the main Library and the branches.

RELATION OF THE LIBRARY TO THE AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.

As the national agricultural library, connected with the national institution for agricultural research, it has been the aim of this library to extend its services as far as possible to the investigations in agricultural science throughout the country. The land-grant colleges and experiment stations, though State institutions, are supplied in part by funds given by the National Government to the States to be used for their maintenance, and they have certain definite relations with the different branches of the National Government. Their relations with the Department of Agriculture are closer than with any other department of the Federal Government, and it is felt that they have, therefore, a just claim to a share in the services of the Library of the department. In its general relations with the land-grant colleges and experiment stations the Department is represented by the Office of Experiment Stations, which, as a central agency established for their special benefit, has aided them in a variety of ways and has sought to promote cooperation between them and the Department of Agriculture in their various undertakings. A glance at the publications of the office shows how close a relationship exists between these institutions and the Department. The publications of the Bureaus of the Department in recent years also shows that the number of cooperative undertakings on the part of these State institutions and the Department is steadily increasing.

Through the Association of the American Agricultural Colleges and Experiment Stations and the Office of Experiment Stations the various State experiment stations, as well as the colleges with which they are connected, are brought together so as to form, with the National Department of Agriculture, a national system of agricultural education which is often referred to as the most complete in the world. There is, however, one link lacking in this system, namely, the libraries, which, except indirectly, have taken little part in the work of cooperation among these institutions. This is especially to be regretted, since the libraries of the various State land-grant colleges and experiment stations are to a large extent alike, are all interested in the same literature, and all have very much the same problems to solve. Mention was made in the report of the Library for last year of the Agricultural Libraries Section which has recently been formed in connection with the American Library Association. This section should to some extent be able to do for the libraries of the agricultural colleges and experiment stations what the Association of the American Agricultural Colleges and Experiment Stations has done for the colleges and stations themselves. It is hoped, in addition, that a relationship may in time exist between the Department Library and the libraries of the agricultural colleges and experiment stations somewhat similar to that existing between the Office of Experiment Stations and these institutions, and that through this relationship, combined with the work of the Agricultural Libraries Section, a closer cooperation may be brought about between the agricultural libraries which will be productive of good results.

Mention has already been made of the efforts of the Library to serve the agricultural colleges and experiment stations through the printing of cards for department publications and for the accessions to the library, through the loan of its books, and by the distribution to them of its duplicates. It has also attempted, in a limited way, to supply bibliographical information relating to the literature of agriculture. The Department of Agriculture as a whole may be considered a bureau of agricultural information as well as an institution of agricultural research. Each bureau and division of the department is called upon to answer requests for specialized information in its own particular field. The questions which the Library has received in the past would seem to indicate that it is regarded as the natural source of information regarding the literature of agriculture. In endeavoring to perform this service the Library has been greatly aided by the cooperation of the scientists of the department and by its close relationship with the Library of Congress, which is regarded not only as the National Library but also is coming more and more to be regarded as the national bureau of information for libraries. It is hoped that funds will be available for improving the special equipment of this Library for this particular service. Information in regard to the resources of other libraries in the subjects relating to agriculture would be an important part of this equipment. The Office of Taxonomic Investigations of the Bureau of Plant Industry has already done much along this line for the subject of botany. Furthermore, the Library of Congress has on file a combined card catalogue of several large reference libraries, which is available for consultation and is of great service in learning the resources of other libraries.

Scarcely a year passes in which groups of libraries do not undertake some cooperative work for their mutual benefit. Each library is no longer regarded as a separate unit but as an integral part of the whole library system, the object of which is to make the resources of all libraries readily available to as large a number of people as possible and to do away with unnecessary duplication of books and work, thereby greatly increasing the general efficiency of the whole system. In this great system it is the aim of this Library to be able to do its share for the literature of agriculture by increasing and perfecting its collections in order that it may fully meet the demands made upon it, and by making the collections and the services of the Library widely useful. But it can not do this alone. Even with greatly increased appropriations and improved equipment it can not fully perform this service without the cooperation of other libraries, institutions, and individuals that are interested in agricultural investigations. For this cooperation and interest the Library makes an earnest appeal.

HISTORICAL SKETCH OF THE LIBRARY.

The present year being the fiftieth anniversary of the establishment of the department, it seems fitting that the report for the year should include some reference to the history and growth of the Library. The Library may be said to have been established with the establishment of the department in 1862, but its foundations were laid in the agricultural division of the Patent Office, which was created as early as 1839. In that year an expenditure of $1,000 was authorized from the funds of that office under the direction of the Commissioner of Agriculture for collecting and distributing seeds, prosecuting agricultural investigations, and procuring agricultural statistics. Similar appropriations were made in the years 1842, 1843, 1844, 1845, and 1847, and annually thereafter up to and following the year 1862, when the department was established. It is quite probable that at least some small part of this appropriation was spent for books necessary in compiling the agricultural statistics. The first definite appropriation for the Library was in 1864, while Isaac Newton was commissioner, in which year $4,000 was appropriated for the Library and Laboratory jointly. No information is available as to the exact size of the agricultural collection in 1862, when the books in the agricultural division of the Patent Office were transferred to the new Department of Agriculture, but it was probably small, as no separate room was set aside for the Library until 1868, when, with the other offices of the department, it was moved to the newly completed building for the department. It occupied at that time the western end of the first floor of the building, now occupied by the Disbursing Office. It was furnished with mahogany book cases, some of which are still in use in the Library. No separate report on the library is given in the report of the Commissioner of Agriculture for 1868, but it contains considerable material of library and bibliographical interest. In a chapter devoted to "Foreign exchanges" appears the following:

> This department recently entered upon a system of exchange with foreign governments, societies, and individuals. Brief as has been the period since this system was inaugurated, it has been attended with gratifying results * * * Already the increase of the Library by this means has been considerable. Valuable books and periodicals, English, German, French, Spanish, Italian, Danish, and Swedish, have been added in exchange for our own publications.

The report also contains a chapter devoted to reviews of "Recent agricultural books," a very considerable list of "American works on agricultural and rural economy," and a list of "Agricultural and horticultural periodicals." How many of these books and periodicals were contained in the library at that time is not stated.

The first separate appropriation for the Library was made on July 12, 1870, and amounted to $1,000, exclusive of salaries. Appropriations for the Library were made annually thereafter and ranged from $1,000 to $3,000 for the fiscal year 1894, exclusive of salaries. In the fiscal year 1895 the appropriation for books, periodicals, and the general expenses of the Library, exclusive of salaries, was increased from $3,000 to $6,000. Since that time it has been steadily increased, the appropriation for the present fiscal year being $15,500 for books, periodicals, and the general expenses of the Library, and $25,080 for salaries.

The Library of the Department was first officially recognized by the appointment of J. B. Russell as Librarian in 1871.[1] Previous to that time Dr. Eldridge and later Mr. C. R. Dodge devoted a considerable part of their time to the Library, but were not specifically appointed as librarians, as they had other duties to perform. Mr. Russell served as librarian from 1871 to October 30, 1877. The terms of succeeding librarians have been as follows: Mrs. Ernestine H. Stevens, Librarian, November 1, 1877, to August 27, 1893; Mr. Wm. Parker Cutter, Librarian, August 28, 1893, to December 31, 1900; Miss Josephine A. Clark, Librarian, January 1, 1901, to June 30, 1907; Miss Claribel R. Barnett, Librarian, July 1, 1907, to date.

Until 1887 the Library continued to occupy the room into which it was moved in 1868. In the Report of the Commissioner of Agriculture (Norman J. Colman) for 1887 is found the following:

> Every year since the establishment of the Department Congress has annually appropriated money for the maintenance of the library, for the completion of series, and for the purchase of scientific and other works, and yet the space for the storage of this vast and valuable collection remains the same as it was 20 years ago. A

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[1] See "Historical Sketch of the Department of Agriculture," by C. H. Greathouse, p. 54.

well-equipped library, systematically arranged and properly conducted, is an imperative necessity to any scientific institution—it is the fuel to the fire. For years the Department's works have been crowded into a room too small for the purpose, with no suitable place for preservation from insects and dust or against loss and confusion, always in anticipation that it would be deemed wise on the part of Congress to relieve a condition of affairs here which in ordinary business would be corrected without delay. I have been compelled to recognize these dangers, and in order to better systematize the library and to protect valuable public property, much of which can not be replaced, I have removed the museum objects from exhibition in the main building to another portion of the grounds, and am now engaged in removing the library to that floor, where it will have abundant room for many years to come. With a new laboratory building, and with this change, the Department will be temporarily relieved of the present pressure for room, though the erection of a new and properly arranged Department building of less inflammable character than the present one would still seem to be the part of wisdom.

From the following extract from the report of the commissioner for 1889 one may infer that larger quarters were not, however, all that was needed for the usefulness of the Library:

> An essential to efficient work is a well-selected and well-stocked library, which shall cover all the lines of inquiry of agriculture and agricultural science. It is useless to attempt to do first-class work that shall pass the scrutiny of the sharpest criticisms without having at hand what has been done and said in the past and what is constantly coming in from a prolific press. Our library, of something like 20,000 volumes only, is specially weak in the Government publications, some of which are of rare merit; in the agricultural reports of the several States, for which there is a great demand; in general agriculture, without which no one can well treat agriculture historically; in foreign agricultural reports and publications, without which in these times of cosmopolitan thought and work no such library as ours is properly equipped; and in several lines specially needed by the respective divisions of the Department. All the divisions need strengthening. The library has but a fugitive volume or two of any herd book, and is so wofully lacking in many lines that I refrain from further specifying.
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> In the change of the library from the old room, which was so small as to compel a suspension in a measure of the collection of more books and the rejection of the Government publications, to ampler quarters, it was, for want of help, badly disarranged, so that what we had was so difficult to find that it was almost a bar to any attempt to make a comprehensive study of any topic. A special effort has been made to rearrange and reclassify it, and we now hope for a more satisfactory use of what we have and for an appropriation sufficient to fill up the gaps and place it on a proper footing.

The work of classifying the Library above referred to was done by Mr. W. I. Fletcher, Librarian of Amherst College, who in the summer of 1889 was specially employed for a period of about six weeks to reclassify the collection. He prepared a scheme of classification for the Library (which classification with amplifications is still being used by the Library), and with the assistance of four or five persons began a shelf list. This was carried on and completed after Mr. Fletcher's special work of classifying was done.

The next important date in the history of the Library was 1893, when a civil-service examination was held for the position of Librarian of the Department. Previous to this date the position had not been under the Civil Service. The report of the Secretary of Agriculture for the fiscal year 1894 contains the following reference to the Library:

> Since the present librarian, Mr. W. P. Cutter, who was certified by the United States Civil Service Commission, took charge of the library of the Department of Agriculture modern methods have been introduced, for the first time, into its conduct. A dictionary catalogue has been instituted, and the books have been arranged in a regular system, in accordance with which the valuable material in it will be made available for students. The increased appropriation has been used to fill out the fragmentary sets of scientific periodicals and to purchase works bearing upon the sciences studied by the Department experts. A reading room has been arranged and increased facilities provided for the convenience of investigators. The library has been made in this manner a working laboratory instead of a miscellaneous storehouse.

The number of volumes contained in the library at the time of its reorganization in 1893 was estimated by Mr. Cutter to be about 45,000. In 1899, under the direction of Mr. Cutter, the issuance of printed cards for the publications of the department was begun by the library. It was, as far as known, the first attempt on the part of any institution to furnish to the outside world a complete printed card catalogue of its publications. The service in printed cards was still further extended in 1902 under the direction of Miss Josephine A. Clark, who was at that time librarian, when the printing by the Library of Congress of the catalogue cards for accessions to this library was begun, the library of the department being the first of the Government department libraries to cooperate in this way with the Library of Congress. It was also under Miss Clark's direction that there was begun, in 1904, in cooperation with the Library of Congress, the preparation of a printed card index to three important foreign agricultural journals, namely, Annales de la science agronomique, Landwirtschaftliche Jahrbücher, and Die landwirtschaftlichen Versuchsstationen. In addition to issuing the printed cards above referred to, the Library has printed separate lists of its publications relating to botany, forestry, irrigation, and entomology and lists of its periodicals. It has also published a quarterly bulletin of its accessions from January, 1894, to December, 1909, and a monthly bulletin of its accessions since January, 1910.

It is not necessary to describe here the present extent and activities of the Library, as they have been previously described in this report. The Library continued to ocupy the large room on the second floor of the main building, into which it was moved in 1887, until the completion in 1908 of that "new and properly arranged department building of a less inflammable character than the present one" which was so earnestly recommended by the Commissioner of Agriculture in his report for 1887. The moving of the Library to the ground floor of the east wing of the new laboratory buildings was begun on March 26, 1908, and completed on May 20, 1908, during which time there was, however, no interruption in the circulation of books and periodicals. It contained at that time nearly 100,000 volumes, but of this number only about two-thirds were filed in the main library, the remainder being filed in the bureau and division libraries. The moving of the Library to the new building in 1908 relieved for a time the crowded condition which existed in the old building, but the space assigned to it was only sufficient to provide for about three years' growth; therefore there is again the same imperative need for additional room. The rooms, being designed for laboratories, are also not well adapted for library use. It is, however, a matter of congratulation that the Library is now stored in a fireproof building, as it would mean an almost irreparable loss to the department if its collections were destroyed. The many inconveniences of the present temporary quarters are overlooked as much as possible by dwelling hopefully on the prospect of adequate and convenient quarters especially designed for the Library, which, according to the present plans, are to be provided in the new administration building when it is built. This will be an event of special importance to the Library, for at no time in its history has it been housed in quarters planned for library use. With ample room suited to its various requirements the Library will more nearly be able to perform its proper service.

APPENDIX.

SERIES FOR WHICH THE DEPARTMENT OF AGRICULTURE LIBRARY PREPARES CARDS FOR PRINTING BY THE LIBRARY OF CONGRESS.

Annales de la science agronomique.
Argentine Republic—Agricultura, Ministerio de. Anales . . . Sección de immigración, propaganda y geografía.
Argentine Republic—Agricultura, Ministerio de. Anales . . . Sección de química.
Beiträge zur kryptogamenflora der Schweiz.
Berlin. Kgl. Tierärztliche hochschule—Hygienisches institut. Arbeiten.
Bibliothèque d'agriculture coloniale.
Biologia centrali-americana.
Bohemia—Landeskulturrat—Deutsche sektion. Arbeiten.
Botanische exkursionen und pflanzengeographische studien in der Schweiz.
Buitenzorg, Java. 's Lands plantentuin. Mededeelingen. (Now superseded by Mededeelingen of Dept. van landbouw, Dutch East Indies.)
Calcutta. Royal botanic gardens. Annals.
Canada—Department of agriculture—Forest branch. Bulletin.
Canada—Department of agriculture—Live stock commissioner's branch. Bulletin.
Cold Spring Harbor monographs.
Deutsche gesellschaft für züchtungskunde. Arbeiten.
Deutsche landwirtschafts-gesellschaft. Anleitungen für den praktischen landwirt.
Deutsche landwirtschafts-gesellschaft. Arbeiten.
East Indies (Dutch)—Departement van landbouw. Mededeelingen.
Encyclopédie vétérinaire (Cadéac).
Federated Malay States—Department of agriculture. Bulletin.
Fiji—Department of agriculture. Bulletin.
Germany—Auswärtiges amt. Berichte über land- und forstwirtschaft im auslande.
Germany—Reichsamt des innern. Berichte über landwirtschaft.
Hawaii—Agriculture and forestry, Board of—Forestry, Division of. Botanical bulletin.
Hawaii—Agriculture and forestry, Board of—Forestry, Division of. Bulletin.
Hawaiian sugar planters' association—Experiment station—Division of agriculture and chemistry. Bulletin.
Hawaiian sugar planters' association—Experiment station—Division of entomology. Bulletin.
Hawaiian sugar planters' association—Experiment station—Division of pathology and physiology. Bulletin.
India—Agriculture, Dept. of. Memoirs. Botanical series.
India—Agriculture, Dept. of. Memoirs. Chemical series.
India—Agriculture, Dept. of. Memoirs. Entomological series.
India—Forest dept. Forest bulletin.
India—Forest dept. Forest pamphlet.
India—Mysore—Agriculture, Dept. of. Entomological series. Bulletin.
India—Mysore—Agriculture, Dept. of. General series. Bulletin.
Indian forest memoirs. Economic products series.
Indian forest memoirs. Forest botany series.
Indian forest memoirs. Forest zoology series.
Italy—Direzione generale dell' agricoltura. Annali di agricoltura.
Kew. Royal gardens. Bulletin of miscellaneous information. Additional series.
Landboskrifter.
Landwirtschaftliche hefte, herausgeber dr. L. Kiessling.
Landwirtschaftliche jahrbücher.
(Die) landwirtschaftlichen versuchsstationen.
Lloyd library. Bibliographical contributions.
Massachusetts—Agriculture, State board of. Bulletin.

Minnesota botanical studies.
Minnesota plant studies.
Mitteilungen aus dem forstlichen versuchwesen Österreichs.
Monographien landwirtschaftlicher nutztiere.
New South Wales—Department of agriculture. Farmers' bulletin.
New South Wales—Department of agriculture. Science bulletin.
New York (State)—Department of agriculture. Bulletin.
One and all garden books.
Padua. R. Stazione bacologica sperimentale. (Not a current series.)
Pennsylvania—Department of agriculture. Bulletin. (Cards printed since 1900.)
(Das) pflanzenreich (Engler). (Earlier cards were printed by the Library of Congress.)
Philippine Islands—Agriculture, Bureau of. Bulletin.
Philippine Islands—Agriculture, Bureau of. Farmers' bulletin.
Philippine Islands—Agriculture, Bureau of. Press bulletin.
Pusa. Agricultural research institute. Bulletin.
Queensland—Department of agriculture. Bulletin. (Not a current series.)
Rogue River Valley, Ore. Pathologist. Bulletin.
Sweden—Landtbruksstyrelse. Meddelanden. (Have printed cards for numbers of this series having a personal author, since 1903.)
Texas—Department of agriculture. Bulletin.
Torrey botanical club. Memoirs.
U. S.—Department of agriculture. Publications.
U. S. National herbarium. Contributions. (Earlier cards were printed by the Library of Congress.)
(Die) vegetation der erde (Drude). (Earlier cards printed by the Library of Congress.)
Vienna. K. K. zoologisch-botanische gesellschaft. Abhandlungen.

REPORT OF THE DIRECTOR OF THE OFFICE OF EXPERIMENT STATIONS.

U. S. Department of Agriculture,
Office of Experiment Stations,
Washington, D. C., October 15, 1912.

Sir: I have the honor to present herewith the report of the Office of Experiment Stations for the fiscal year ended June 30, 1912.

Respectfully,

A. C. True, *Director.*

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTION.

The work of the Office of Experiment Stations during the last year included, as heretofore, the supervision of the expenditures of Federal (Hatch and Adams) funds by the agricultural experiment stations in the several States and Territories; conferences and correspondence with station officers regarding the management, equipment, and work of the stations; the collection and dissemination of information regarding the progress of agricultural education and research throughout the world; the management of the agricultural experiment stations in Alaska, Hawaii, Porto Rico, and Guam; the promotion of the interests of agricultural colleges and schools and farmers' institutes in the United States; and investigations on irrigation and drainage and of problems relating to the utilization of agricultural products as food for man.

The progress and present status of these different lines of work are briefly reviewed below.

RELATIONS WITH AGRICULTURAL EXPERIMENT STATIONS.

The work of the office in its relations with the experiment stations during the past year has kept pace with the continued growth of the activities of these institutions. The policy of the office in relation to the Hatch and Adams funds, the apportionment of salaries in cases where station officials have also college and other duties, the approval of Adams fund projects and their continuation and completion when once entered upon, extension work by station men, and the matter of station publications has not changed, and the inspection of the stations was made with a view to holding consistently to the established course. The last year's inspection showed that there has been a general improvement in the methods of handling station accounts. The voucher check system of accounting is coming into use, and has been found to have many decided advantages; more care is being exercised to secure uniformity in the classification of items, which is of great value in comparison of expenditures of the various stations; and the liabilities of the stations are more promptly met.

With regard to the question of making a fixed charge against the Federal funds for administrative expenses, which has come up at different times, the office has held that in all cases where the director of the station is a separate officer charged with the general management of station affairs, the payment from these funds of a portion of the salary of the president of the institution as a whole is not warranted, and that the expense of station accounting should be limited to only such a charge against the Hatch fund as is involved in the simple bookkeeping required by this department to show how the $30,000 of the Hatch and Adams funds has been expended each year. Experience has shown that when a station is properly organized the expenses connected with the conduct of its financial affairs can be reduced to a relatively small amount. Efforts have been continued to secure a larger amount of definite experimental work with the Hatch fund, by relieving it from charges for general maintenance, compiled publications, demonstrations, and various forms of extension work.

The insistence by this office that the Federal funds (both Hatch and Adams) shall be held strictly to experimental work, and not used for extension work and other lines of endeavor not clearly experimental, instead of being a hardship to the stations in aiding them and the colleges with which they are connected in putting their work on a sound basis, and securing adequate State aid for important work which can not be provided for out of the Hatch and Adams funds. In some States the appropriations for extension work are greater in amount than the Federal funds, and in most States the Federal funds, if their use for the purpose were legitimate, would be inadequate to support a uniformly efficient extension service for the entire State.

Realizing from the beginning the importance and necessity of using the Federal funds for experimental and research work only, the office has emphasized the need of systematizing the extension work and organizing it under the supervision of the agricultural colleges. It is essentially an important feature of agricultural education, and it is held to be primarily the business of the State to provide for an extension system in agriculture within its borders. In the nature of the case the responsibility for it necessarily rests on the agricultural colleges, although valuable assistance is derived in many instances from the National and State departments of agriculture.

To realize what progress has been made along this line we have only to consider that already some form of organization for extension teaching in agriculture exists in 43 of the State agricultural colleges, and in all of these institutions extension directors have been appointed and placed in charge of the work. Of these only eight are also directors of experiment stations, which indicates a prevailing tendency to place extension work on an independent footing and separate it from experiment station work proper. Under this arrangement the investigator is freed from the burden of giving general agricultural instruction to all classes of the agricultural public, while it does not prevent him from giving an occasional lecture if he be so inclined and his other duties permit.

While the shaping up of the extension field is progressing, much remains to be done, especially as regards the uniformity in organization and the adoption of the most practical and efficient plan. This office continues to favor the arrangement by which the activities of the agricultural college are grouped and differentiated under three heads, namely, research, interior teaching, and extension. The research work is the field of the experiment station, the interior teaching is done by the faculty at the college, and the extension work is performed by the extension division.

Agricultural extension work in this country needs a broader organization, so that all of the agricultural population of the State may be reached and will not be complete until this is accomplished. The immensity of the problem at once shows the inadvisability of burdening the experiment station with any considerable part of this task. When properly organized the three different divisions are coordinate and the work is cooperative. The extension force, in more immediate and general contact with the farmers of the State, discovers problems which need solution; these are worked out by the station, and the results in turn are given to the body of agricultural students through the college faculty proper and to the general agricultural public by the extension teachers.

The work in all lines is growing rapidly and the demands far outrun what is possible to accomplish with the limited resources and forces at the disposal of the individual institutions. There is at present much loss of time and energy due to the conditions necessarily involved in the rapid development of a nation-wide movement. Lack of a sufficient number of well-trained men is causing excessive competition for the successful workers and bringing about far too much shifting of men from one institution to another. Frequent erection and equipping of new buildings are absorbing a relatively large share of the time of the men who should be teaching or experimenting. The simple administrative organization suitable to the day of small things is proving inadequate to meet the requirements in institutions having large annual incomes and dealing with hundreds of resident students and many thousands of people seeking aid through extension enterprises. Under such conditions the experiment stations are likely to suffer most from the growing pressure to divert the work of members of their staffs into other lines than those of research. In many places good research men are being persuaded or compelled to give too much attention to distracting administrative duties or to teaching and popular writing or lecturing. Here and there already even graduate students are becoming numerous enough to prove an embarrassment to the research departments. The patient and absorbing pursuit of research year in and year out is still very difficult to secure in American colleges and scientific institutions. It is therefore necessary for this office to persist in urging a more definite organization and immediate supervision of the experiment stations with reference to the most efficient planning and conducting of substantial researches on agricultural problems, the safeguarding of the time and energy of men devoting themselves to research, and the provision of the proper atmosphere, privileges, equipment, and compensation for such workers, regardless of the growing demands for teaching and extension work, which should be met in other ways. Boards of management and general administrative officers, as well as legislatures and the public, in the United States have still much to learn as to the wisdom and necessity of making the research institutions deriving their support from public funds as strong and efficient as possible. Unless this is done in the case of the agricultural institutions, the progress of the proper education of our rural people will be greatly hindered, and the highest success of our agriculture will be indefinitely postponed.

During the past year the office called attention to the irregularity in publishing the annual report at many stations, and urged the adoption of a definite and regular policy with regard to this particular publication. It was pointed out that the publication of an annual report is required by the Hatch Act; that the uncertainty in publishing it is a great inconvenience to libraries and other institutions or individuals endeavoring to keep complete files; and that the requirements of a full and detailed report are not always fulfilled. One of the great disadvantages of discontinuing the annual report or of publishing it in a merely perfunctory manner is the loss of the station history. The annual report of the station should be so written as to give a systematic record by which the history and evolution of the station can be traced, and show from year to year the public support which the institution has received and how the scope of its work has broadened. The office has maintained that there is a place for such a document and that its value warrants the expense and the effort of its preparation. As a rule, State institutions issue annual reports on their activities, and it is not apparent why the experiment station, which is one of the most prominent and important State institutions, should not do so.

Consideration was further given to the needs and requirements of station publications in general. The number and variety of publications issued by the stations at present tend to obscure the research character of the institution. The number of publications has greatly increased, while their miscellaneous character has not diminished. In many cases the station publications include popular, semipopular, and technical articles, based in part on station work and in part on general sources of information. Among these are inspection bulletins, announcements of college courses, nature-study pamphlets for teachers and pupils, and other similar matter, which give a wrong conception of the stations as primarily research institutions, and prevent a proper appreciation of their real contributions to the science of agriculture, for whose advancement they were established. The research work of the stations should stand out in bold relief. To bring this about, several of the stations are now publishing successfully a distinct and separate series of technical bulletins, which report their investigations in more scientific language and detail. The number of stations adopting this plan is growing. Since this technical matter is of value and interest to a particular class of readers, it is necessary to have separate mailing lists for the different classes of readers which the station intends to reach, in order to distribute its publications in an economical and profitable way.

There is still need of a general publication in which the scientific work of the stations would be brought together and thus comprehensively given out to the scientific world. The establishment of such a publication with adequate financial support is also much needed to provide for the issuing of a constantly growing mass of research material now being withheld from adequate publication from lack of funds for printing.

Many stations still issue compiled bulletins of an entirely popular character, though the office has prohibited the use of the Federal funds for this purpose. This does not mean that the popular accounts of actual experimental work and its results are to be eliminated, but the object of this policy is to confine the popular bulletins of the stations to such accounts. The popular compiled bulletins are an essential feature of extension work and it is to be hoped that the time will speedily come when the stations will leave the issuance of such publications entirely to the extension departments.

This office has urged, furthermore, that popular accounts of the station work should give the station credit for having furnished the basis for the discussion by referring definitely to its experiments, so that the account may not appear to have been compiled from general sources of information. While the general principle that the station man should be left free for his investigations and experiments in proportion to his salary from station funds has not yet been fully recognized in all places, encouraging progress has been made in a number of institutions where the extension departments organized in the agricultural colleges have taken over the matter of issuing popular circulars and bulletins and disseminating general agricultural information which is not strictly first hand.

The work of the office in its relations with the stations has been the special duty of the director, the assistant director, Mr. W. H. Beal, Dr. W. H. Evans, and Mr. J. I. Schulte.

RELATIONS WITH INSTITUTIONS FOR AGRICULTURAL EDUCATION.

In several previous reports I have called attention to the rapid development of agricultural education in all parts of the United States and to the growing demands upon the Office of Experiment Stations for advice and assistance, involving not only the preparation of publications specifically for the use of teachers of agriculture, but also a thorough study of the broader problems of agricultural education, including the attendance of specialists in agricultural education at important conferences and conventions and visits by them at schools of different types engaged in teaching agriculture. As shown in a subsequent paragraph of this report, the agencies for carrying information concerning country life and agricultural production to the masses of people living upon the farms have increased during the past year more rapidly than ever before, with a proportionate increase in the calls upon us for assistance from State and National organizations and officers charged with the immediate responsibility for promoting this movement.

The problems of the organization of agricultural education throughout our vast country are so new and numerous that the Department of Agriculture, by making a broad study of these matters and collecting and publishing the results of experience in our several States and in foreign countries, can be of great assistance in an advisory capacity to school officers and teachers and greatly promote efficient instruction in agriculture throughout the United States. Moreover, there is a great work to be done in putting into available form for school use the information on agricultural subjects constantly being accumulated by this department and the experiment stations. This office, acting in cooperation with the other bureaus and the stations, should be in a position to prepare bulletins, charts, and other illustrative material showing how agricultural subjects may be utilized for the education of our people with a view to making our agriculture most productive and country life most satisfactory.

In order to perform work in these lines in a more satisfactory and adequate measure I recommend that at least $10,000 be added to the appropriation for the work of this office in agricultural education for the fiscal year 1914.

And since the agricultural education work of the office is largely concerned with conferences and conventions, as well as with special schools for teachers, institute workers, and others, many of which, especially those most in need of help, have no funds to pay the expenses of employees of the office, I urge that specific authority be given the officers and employees of the Office of Experiment Stations to pay necessary expenses for travel and subsistence from the funds appropriated for their work.

The educational work of the office is divided into two sections, one dealing with agricultural colleges and schools and the other with farmers' institutes and other forms of extension work in agriculture.

THE AGRICULTURAL COLLEGES AND SCHOOLS.

All phases of agricultural education have advanced rapidly during the fiscal year 1912. The land-grant colleges have enrolled more students and reached many more people through extension schools and courses than in any previous year, and more than two-thirds of them engaged in one way or another in the preparation of teachers of agriculture.

Agricultural schools of secondary grade have increased in number and many public high schools have inaugurated courses in agriculture, home economics, and manual training. According to a list published April 30 by this office, the total number of secondary schools teaching agriculture has increased from 566 in May, 1910, to 2,103 at the present time.

Increasing attention has been given to the elementary phases of instruction in agriculture. In the South the membership of boys' and girls' agricultural clubs increased from 46,000 in 1911 to about 60,000 in 1912, and there has been a corresponding growth of this movement in other parts of the country. Of colleges, public and private, and all grades of lower schools teaching agriculture, the number on the lists of the office increased from 863 in 1910 to 2,575 in 1912, an increase of nearly 200 per cent in two years.

Through its agricultural education service the Office of Experiment Stations has maintained advisory relations with all phases of this movement. Upon invitation it has conferred with State school authorities and others regarding courses in agriculture, the establishment of new schools, and the equipment and management of existing schools. This work has continued to be in charge of Mr. D. J. Crosby, specialist in agricultural education, who has been assisted by Messrs. C. H. Lane and B. B. Hare, assistants in agricultural education; Miss M. T. Spethmann, in charge of foreign literature on agricultural education and the card catalogues of American and foreign agricultural schools; and Miss M. A. Agnew, in charge of the card directory of teachers and investigators in agriculture, the organization lists of the agricultural colleges and experiment stations, and the official mailing list.

The editorial work of the department of agricultural education in the Experiment Station Record involved the reviewing of 2,300 foreign publications and about 1,500 American publications. The regular publications relating to the statistics and organization of the agricultural colleges and experiment stations, lists of educational publications and institutions, and the annual review of progress in agricultural education were issued. In addition to these a bulletin describing the county schools of agriculture and home economics in Wisconsin, a circular containing a report on college courses in rural economics and farm management, a Farmers' Bulletin on Forestry in Nature Study (in cooperation with the Forest Service), and a Yearbook article on Community Work in the Rural High School were prepared and published. Other publications relating to agricultural schools in Arkansas, types of children's garden work, and a working erosion model for schools prepared in the Forest Service were submitted for publication.

Considerable time was given to the study of American agricultural schools and methods of instruction in agriculture. On invitation from State school officers, the specialist in agricultural education and one of his assistants studied schools and methods of elementary and secondary instruction in agriculture in California and Oregon, attended and addressed several conferences of education in those States, and helped to map out plans for the future development of agricultural education in their schools. Also on invitation, an assistant in agricultural education visited and studied all of the agricultural schools in Georgia and is preparing a report on them. In cooperation with the Forest Service, short courses in woodlot management were conducted experimentally at the Agricultural High School of Baltimore County, the Manassas Agricultural High School, and the public high schools at Sandy Spring and Brookville, Md., with a view to working out carefully some of the problems of conducting such courses and then publishing the results for the benefit of other similar schools. In cooperation with the Bureau of Plant Industry, the office detailed Miss Susan B. Sipe, science teacher in Normal School No. 1 of the District of Columbia, to make a study of types of children's garden work in several large cities and in State educational institutions from Pittsburgh to the Pacific coast, and her report has been submitted for publication.

The card index of foreign schools and literature now contains over 9,000 cards, that of American schools and literature over 11,000 cards, and that of American teachers and investigators in agriculture about 2,600 names. In addition to these there is a card directory of about 2,500 American teachers in secondary and elementary schools, mainly teachers of agriculture. These card lists are valuable sources of information, not only for members of the office staff, but also for institutions in quest of teachers of agriculture.

Cooperation with the Association of American Agricultural Colleges and Experiment Stations has been continued. The director of this office has continued to act as bibliographer of the association, as chairman of its committees on instruction in agriculture and on the history of agricultural education, and as dean of the Graduate School of Agriculture, the fifth session of which began July 1 at the Michigan Agricultural College. The agricultural education service of the office helped prepare the report of the association on instruction in rural economics and farm management and has begun collecting data for a report on the work of the agricultural colleges in training teachers of agriculture.

Members of the agricultural education staff have attended numerous conferences on agricultural education and have spoken at several large gatherings of teachers. This work and that of visiting and studying agricultural schools has taken our men into 28 States, over 38,500 miles of railway travel, at a total cost to the office of $1,328. Local agencies paid one-fourth of the cost of the field work of the service and would have been willing to pay for additional assistance of the kind if members of the staff could have given more time to this work. This, however, could not be done with so few people to attend to the rapidly growing correspondence, the preparation of publications, and other regular work of the office.

EDUCATIONAL WORK, 1912–13.

In its educational work during the current year the office is laying especial emphasis on the preparation of publications helpful to teachers of agriculture in the elementary and secondary schools. It will also continue advisory work along the same lines as heretofore in response to the requests of school officers and lecturers in the several States and will review the progress of agricultural education at home and abroad.

FARMERS' INSTITUTES AND EXTENSION WORK.

Reports were received during the year from 42 States giving data respecting their institute work. In 40 of these States regular institutes were held to the number of 5,663; 3,763 were one-day meetings; 1,717 two days; and 183 three days or more—a total of 7,746 days.

The total number of sessions was 15,965, with an aggregate attendance of 2,272,146. If the States and Territories not reporting equal the sessions and attendance of last year, the aggregate number of sessions for the entire country will amount to 19,142 and the attendance to 2,590,371, as against 16,741 sessions in the previous year and 2,291,857 attendance, an increase of 2,401 sessions and 298,514 attendance. The special institutes aggregated an attendance of 1,389,266, making the entire attendance at institute meetings of all kinds 3,979,637, an increase of 364,087.

One hundred and sixty-four movable schools were held, continuing through 799 days, with an aggregate attendance of 137,699. Fifty-one railroad instruction trains were run, accompanied by 287 lecturers. These trains were conducted over 37,818 miles of track, made 1,856 stops, and were attended by 958,605 persons. Five hundred and ninety-eight independent institutes were held, attended by 134,748 persons, and continued through 953 sessions. Thirteen round-up institutes were reported, continuing through 135 sessions, with an attendance of 34,833. There were 458 picnics and conventions, consisting of 623 sessions, attended by 123,381 persons. There were 50 field demonstration meetings conducted by 7 experts, who contributed 620 days to this service. The attendance at these field demonstrations is not reported.

Of the total number of regular institutes held 388 were women's institutes, representing 753 sessions, with an attendance of 53,194, and 100 institutes were for young people continuing through 163 sessions, with an attendance of 14,245.

In addition to these regular institutes, 45 movable schools for women continued through 218 days were conducted with an attendance of 11,061, and 28 movable schools for young people were held for 121 days, with an attendance of 6,051.

The total number of lecturers listed on the State force by 35 States reporting is 931. Thirty-three States reported lecturers furnished by their agricultural colleges and experiment stations to the number of 420. Twenty-nine of these States give the days of service contributed by college and station lecturers at 5,778. Forty-nine lecturers attended teachers' institutes through an aggregate of 341 days, and addressed 31,082 persons. Four hundred and two lecturers devoted 594 days to high-school work, meeting 88,505 persons; 9 lecturers contributed 21 days to teaching in normal schools before 2,050 students; and 39 lecturers contributed 2,933 days in lecturing to children in the common schools, meeting 71,579 persons.

Eighty experts were employed as itinerant instructors and advisers by 11 States, contributing 3,780 days of service. Sixteen persons devoted 1,762 days to other forms of itinerant work. Some of the States have separated this form of extension work from the farmers' institute service, and have attached it to the extension division of the agricultural college, reporting it as a part of the work of that division. The reduced number of States reporting itinerant work by their farmers' institutes does not therefore represent a falling off in this character of instruction, but is due to a readjustment of their methods of carrying on the work.

It will be seen by comparing the figures herein presented with those of the previous year that there has been decided growth in institute activity and interest throughout the country notwithstanding the additional force of itinerary workers sent into this field by the extension departments of the colleges and experiment stations whose activities have not been included in this report. That there is room enough for all is clearly manifested as the extension field is developed. The demand is increasing for more and better workers along all lines of rural progress, and it will be many years before the supply will be equal to the need.

There was appropriated by the State governments in 38 States during the year 1911–12 for institute purposes $381,686.54. There was received from other sources $82,885.55, making a total of $467,572.09. Last year the same States contributed $383,093.47, or $84,478.62 less. The appropriations by 30 States reporting for 1912–13 amount to $354,024.

WORK OF THE OFFICE.

The work of the office has been along the same lines as heretofore. Statistical data respecting farmers' institutes and other forms of extension work both in this country and abroad have been gathered and arranged for publication. Addresses before farmers' associations and in educational institutions have been delivered. Bulletins have been prepared; the proceedings of conventions have been edited and published. Officials connected with farmers' institutes, extension departments in the agricultural colleges, fair associations, State libraries, railroad agricultural extension departments, State departments of agriculture, and other associations interested in agricultural extension work have been visited and interviewed. The distribution of printed information has been continued, and the correspondence of the office, which has grown to considerable proportions, has been conducted.

The effort has been to develop some of the forms of extension that are now in operation, and to introduce new methods for use by State officials and college extension directors engaged in disseminating agricultural information, and in itinerant instruction work. Perhaps the most important item in this direction has been the issuing of a course of study adapted to correspondence teaching, and in detailed instructions for conducting this method of extension. Investigations have been conducted to ascertain the effects of extension teaching by the farmers' institutes upon agricultural people, and to secure data relative to the improvement of plans for buildings and grounds for local and State fair associations.

The farmers' institute work of the office as in previous years was in charge of Prof. John Hamilton assisted by Prof. J. M. Stedman.

PUBLICATIONS OF THE OFFICE.

There was little change in the general character, but considerable reduction in the number and volume of the publications of the office during the year. The office issued 85 documents, aggregating 4,761 pages, including 18 numbers of Experiment Station Record, 2 reports, 10 technical bulletins, 5 circulars, 8 Farmers' Bulletins (6 of which were numbers of Experiment Station Work), 5 consecutively paged numbers of Experiment Station Work, 3 farmers' institute lectures, 8 publications of the insular stations, 3 Yearbook articles, 11 monthly lists of station publications, and 12 separates from the annual report of the office for 1910. The number of new publications, excluding revised reprints and separates, was 66, containing about 4,000 pages, as compared with 80 containing about 4,700 pages the preceding year.

The plan of issuing two volumes of Experiment Station Record was followed, as in recent years. To meet the increase in the volume of the literature reviewed in the Record it was found necessary to add another abstract number to each volume, which now consists of six monthly and three abstract numbers, with the usual author and subject indexes. The total number of abstracts included in the two volumes was 7,891, by far the largest number for any year and an increase of over 10 per cent over the number in the two preceding volumes.

As in previous years, the numbers have been made up largely of abstracts of agricultural literature, together with brief notes on the organization, equipment, and development of institutions for agricultural education and research in this country and abroad, and, in the case of the regular monthly numbers, of editorials and special articles on important phases of the progress of agricultural investigation and science. The abstracts have, as usual, covered the publications of the agricultural experiment stations of the United States and the United States Department of Agriculture, researches of experiment stations and similar institutions in all parts of the world, and a large number of articles having a direct bearing upon agricultural science and practice published in book form or in the domestic and foreign journals.

As heretofore, the editorial management of the Record was in direct charge of Dr. E. W. Allen, assistant director, with Mr. H. L. Knight as assistant editor.

The editorial staff was enlarged during the year by the apppointment of Mr. R. Trullinger to have charge of abstracting in rural engineering. Mr. W. E. Boyd succeeded Mr. W. H. Long as assistant in the section of botany and plant pathology. At the close of the year Mr. J. O. Rankin resigned as assistant in the section of farm crops.

The office continued to supplement the Record by a bimonthly review of progress in the more practical lines of investigation at the experiment stations in the Experiment Station Work series of Farmers' Bulletins.

The proceedings of the American Association of Farmers' Institute Workers were prepared and submitted for publication by the department through the office.

The office continued the publication of the card index of experiment station literature. The total number of cards of this index distributed has now reached 32,200. The receipts from sales of the index during the year were $468.81. Mr. M. D. Moore has had charge of the preparation and distribution of this index.

The general editorial work on publications of the office, exclusive of the Experiment Station Record, was, as heretofore, in charge of Mr. W. H. Beal.

INSULAR STATIONS.

The experiment stations maintained by this office in Alaska, Hawaii, Porto Rico, and Guam report having made satisfactory progress with their work during the past fiscal year. There have been but few changes in the personnel of the stations and as a consequence there have been no serious interruptions to their investigations. No change has been made in the policy of the stations, and they are continuing to devote their efforts to bringing about a proper diversification of agricultural industries. In this they are becoming somewhat encouraged, as several industries that have been developed or fostered by them are beginning to assume considerable economic importance. Some of the principal lines of work at the several stations are briefly noted in the accompanying reports.

The stations are rapidly making a place for themselves in the esteem of the people for whom they are maintained. This is shown by local and cooperative support, demand for publications, requests for advice, seeds, plants, etc. The demonstration farms, mentioned in a previous report as supported by local funds and individual contributions, are proving highly successful in carrying the work of the stations to the people. These should and will be extended as rapidly as possible with due regard to the investigational work, which is of the utmost fundamental importance and which should not be sacrificed for popularizing facts already known to scientific men.

The several bureaus and divisions of the department continue their generous cooperation with the stations and it is desired to make proper acknowledgment for this aid.

The administrative work in connection with the insular stations continues to grow and the numerous matters involved require much time and attention. This work continues, as heretofore, to be in charge of Dr. Walter H. Evans. All the fiscal affairs of the temporary disbursing agents are reviewed by the accountant of this office and considerable assistance rendered in seeing that they are in proper form.

During the fiscal year 1912 the appropriation for the Alaska, Hawaii, and Porto Rico stations was $30,000 each, and for Guam, $15,000. These sums were supplemented by sales and other funds, which were available for maintenance and the extension of the work as follows: Alaska, $6,160.33; Hawaii, $13,749.40; Porto Rico, $5,028.95; and Guam, $59.74.

The work of the several stations has increased faster than their revenues and facilities for investigation and there is an urgent need for additional financial assistance for some of them. In Alaska the plant-breeding work, especially that with cereals at the Rampart station, needs a plant house, where different varieties of cereals can be grown and blossomed at the same time and protected so that the crosses shall not be interfered with. The disaster that overcame the stock-breeding work at Kodiak, through the eruption of a volcano on the peninsula 95 miles away, necessitated the removal of the stock at large expense. To care for them and return them next year will be a severe drain on the income of the stations and to meet this emergency $5,000 additional appropriation is asked. In Hawaii the station staff has outgrown its quarters, and additional laboratory space for the horticulturist, the agronomist, and the entomologist is needed. At the Porto Rico station the work in plant breeding, pot experiments in soils and fertilizers, etc., is seriously handicapped on account of a lack of a plant house where control conditions can be maintained. Sudden tropical rains, strong trade winds, etc., have destroyed the work of weeks and this could be avoided by the erection of a plant laboratory at a cost of about $2,500.

ALASKA STATIONS.

The work of the Alaska stations during the fiscal year ended June 30, 1912, was eminently successful. The fall of 1911 was mild, and the summer continued later than usual, with the result that vegetables, grains, etc., matured well. The advantageous weather made possible more work in the fall, enabling better preparation for spring seeding.

As has been indicated in previous reports, the work at the Fairbanks station is being conducted with a view to demonstrating that farming can be made to pay in the interior of Alaska. During the season covered by the report the station had 7 acres in potatoes, 3 acres of which had been previously cultivated, while 4 acres were new soil, and experience has shown that the first crop on such soil is not usually the best. The 3 acres mentioned above produced 18 tons of marketable potatoes, or at the rate of 200 bushels per acre, while the 4 acres of new soil produced at the rate of 125 bushels per acre. Of this production 31 tons were sold in the local market for $3,451.55. The cereal work at Fairbanks was continued with success, and a considerable amount of hay was made. Of the hay, 5 tons, representing the surplus above that needed for station animals, was sold at a price a little better than $50 per ton.

The experiments both at Fairbanks and Rampart have shown that the soil is in need of nitrogenous fertilizer and that the addition of potash and phosphoric acid at present have comparatively little effect.

Three years ago an attempt was made to introduce some of the hardy Siberian alfalfas secured by Prof. N. E. Hansen as agricultural explorer of this department, and several forms of these alfalfas have survived the winter at Rampart and are reported as having made good growth during the summer. Thus far none of them has produced any seed, and the question of vegetative propagation is being given attention. In addition to the Hansen alfalfas, which belong to the species *Medicago falcata*, *M. media*, and *M. ruthenica*, the Grimm alfalfa, a variety of *M. sativa*, survived the past winter, and it is hoped that this strain can also be acclimated in the interior of Alaska. The Turkestan alfalfa wintered perfectly, but at the end of June had not made as much growth as the other species.

The grain-breeding work has been continued at the Rampart station, and it promises to be a success. Several hybrid varieties of barley have already been developed which are decided improvements on the parents, both in earliness and yield. These are to be given further tests in the hope that a variety will be obtained that is a heavy yielder, will mature in a short season, and possess a stiff straw that will withstand storms better than any of the varieties now on hand.

During the winter of 1911–12 Kharkov winter wheat, which is the hardiest wheat thus far found, was badly winterkilled. On the other hand, winter rye came through in good condition and has given a good crop. This confirms what has been previously stated, that rye is hardier than winter wheat, and probably the Alaska farmer will have to substitute rye for winter wheat to a very large extent.

The experiments with oats which have been in progress for 12 years have shown that North Finnish Black, Burt Extra Early, and others may be grown with success in the interior of Alaska, but they are not heavy yielders. Experiments are in progress to develop a variety of oats having the quality of the Swedish Select as regards grain and yield, but which will mature in a shorter season. In order to carry on this grain-breeding work, additional assistance will be needed, and it is probable that a plant house will have to be constructed, so as to produce grains at different times, and thus prolong the season in which the plant breeder can operate.

At the Sitka station the horticultural work is reported as progressing very favorably. The hybridization of strawberries and raspberries has been continued, and a considerable number of hybrid strawberries of large size and excellent quality are being grown for the purpose of testing them on an extensive scale and also propagating for distribution those which prove of superior worth. About 1 acre has been set to these new hybrids, and these will come into bearing during the next year. A few hybrid plants have been produced as the result of a cross between a cultivated variety and a wild species from the interior, which is hardier than the wild species on the coast. Thus far none of these have fruited. Additional experiments have been carried on in hybridizing the raspberry and the salmonberry, and some of the plants have produced fruit this year. The fruit, though firmer, is smaller than the salmonberry, and thus far has not shown any indication of the raspberry flavor. This work will be continued in the hope of producing a cross that will be an improvement. Of the tree fruits the cherries and apples have flowered abundantly and set a fair crop of fruit.

Some cooperative experiments with the Forest Service are being conducted with basket willows, and these plants have made a satisfactory growth during the past year. The other horticultural operations have been entirely satisfactory on account of the favorable season.

The live-stock work at the Kodiak station with cattle and sheep has proved eminently successful. Both the herd of Galloways and the flock of sheep increased naturally and rapidly, and the native grasses on which they were pastured proved nutritious and sufficient, the hay and silage made from them maintaining both cattle and sheep during the winter whenever it was necessary to feed. Early in the spring of 1912 11 head of Galloway cows that have proved good milkers were purchased with a view to adding them to the herd on Kodiak Island to serve as a foundation for the development of a dairy strain of Galloways. These were about to be shipped from Seattle when the live-stock work received a severe setback due to the eruption on June 6 of a volcano some 95 miles from the station. Even at this great distance the pastures were covered to an average depth of 14 inches with ashes, rendering it necessary to provide forage for the animals. A few of the sheep were smothered during the fall of the ashes, but none of the cattle died as an immediate result of the eruption. Later some fell a prey to the large bears on the island, and it has been necessary to take unusual measures for the protection of the stock. The heavy fall of the ashes reduced pasturage and hay land to such an extent that some measures will have to be taken to provide for the stock, and this matter is now being given consideration by the special agent in charge. An attempt has been made to determine whether tame grasses, clovers, and cereals will grow in the volcanic ash, and if the preliminary experiments prove successful it is probable that several hundred acres will be seeded next spring to grasses, clovers, and grains.

A tract of land that has been occupied by the station on Kalsin Bay was set aside for its use by Executive order dated April 1, 1912.

HAWAII STATION.

The work of the Hawaii station in attempting to diversify the agriculture of those islands has been continued along the original lines. Since the station's establishment the pineapple industry has risen to second rank in importance of the industries of the Territory, and the area devoted to pineapples is being rapidly increased. In this expansion of the industry the station has taken an active part in determining some of the causes of failure of pineapples to grow in certain soils, particularly those containing large amounts of manganese. Hitherto it was believed necessary to avoid soils that contained more than 2 per cent of manganese if success was to be expected in pineapple growing. Experiments are now in progress which promise to furnish a means of rendering even the highly manganiferous soils available for pineapple culture. The station is carrying on breeding experiments to secure a strain of pineapples less subject to the effects of manganese, and also if possible a more uniform strain of pineapples than those now planted, in order to prevent waste in canning.

The experiments with cotton have shown the difficulties met with in establishing a new industry upon a commercial basis. The experiments thus far have shown conclusively that a good yield of excellent cotton may be produced on lowlands and in protected localities, but that exposed areas, particularly at elevations of 500 feet, should be avoided in planting this crop. On the whole, Caravonica cotton has given better satisfaction than Sea Island, and last year's crop was sold at the station at 18½ cents a pound, and was reported equal to the best Rough Peruvian for use in mixing with wool. Later, offers of 20 cents a pound for the same grade of cotton were received. The methods of pruning worked out at the station and the use of lantern traps have demonstrated means for controlling the cotton bollworm provided they are systematically applied.

A study was made of the pulp which accumulates as a result of decorticating sisal leaves, and it was found to contain high percentages of mineral plant food in a readily available form, and its value as a fertilizer was clearly demonstrated.

Further tests of varieties of rice imported directly from Japan indicate that these rices when grown in Hawaii give a product equal to that imported from Japan in the milled form, and it is probable that the importation of milled Japan rice will not be necessary to the same extent that has been considered necessary in the past. Fertilizer experiments have again shown conclusively that ammonium sulphate is the best form in which nitrogen can be applied to this crop, and that nitrate of soda is quite unsuited to the purpose; moreover, that the fertilizer should be applied to the rice during the early growth of the plant rather than at the later stages of growth, as is the oriental practice.

In cooperation with Territorial authorities the station has devoted considerable time to the study of the habits and life histories of mosquitoes, and also to the problems connected with the Mediterranean fruit fly, which pest has made its appearance in Hawaii. Arrangements have been made for the breeding and distribution of parasites of the Mediterranean fruit fly, which it is hoped may be obtained from Africa.

In connection with quarantine work the station has developed a method of clean culture for bananas by means of which scale infestation can be avoided and which will make it possible to grow bananas which will readily pass quarantine on the mainland.

The continued propagation work with mangoes and avocados has shown that these fruit trees may be easily budded, grafted, or inarched, and that the difficulties in such work are little more serious than those met with in connection with deciduous orchard trees. The selection of strains of highly flavored papayas from trees which bear perfect flowers has been continued, and the work is progressing rapidly.

Some attention has been given to a latex-bearing tree (*Euphorbia lorifolia*) which occurs abundantly in Kona, Hawaii. This tree produces an abundance of latex, the dried material of which contains nearly 60 per cent of a resin which is apparently identical with chicle and from 14 to 17 per cent of true rubber. It is believed that this latex can be profitably used in a commercial way.

A number of other investigations are in progress, among them a study of the kukuinut oil, the means of transmission of Manson's eye worm in poultry, artificial methods of breeding in bees, and a general survey of the soils of Hawaii. This survey has been in progress for about four years and will probably be completed during the coming year.

In cooperation with the Territorial authorities and private individuals a number of demonstration farms have been put in operation on the islands of Hawaii, Maui, Kauai, and Oahu. The work of this station has met with promising success. On the island of Hawaii, at one of the stations, dairying and forage crops are being given especial attention, while near Hilo the culture of bananas and taro are being investigated. The results thus far obtained with taro indicate that the yield and quality of taro may be greatly benefited by proper systems of planting, cultivation, and fertilization.

On Maui the energies of the substation are largely devoted to methods of tapping Ceara rubber trees, drying and curing rubber, a study of the chemical composition of rubber, and intercrops between the trees. Great improvement is already reported in the quality of the rubber obtained and in the economy of its production. At the demonstration farm on Kauai efforts are devoted to growing crops which promise to be suitable for home use and for sale. These include pineapples, peaches, potatoes, onions, corn, and various leguminous plants. On the island of Oahu the substation is occupied primarily with experiments in dry-land farming, the experiments being carried on with legumes, broom corn, potatoes, pineapples, and other crops.

It is already apparent that the branch stations offer an opportunity of obtaining much information in an experimental way, and of bringing the work of the station as a whole before the people, who otherwise could not be reached in such an intimate way.

PORTO RICO STATION.

The work of the Porto Rico station has continued along diversified lines under various groupings. In horticulture, besides the regular work of the station, a considerable number of cooperative experiments are in progress, the essential features of which are to impress upon the attention of planters some of the requisites to successful fruit production. These lines of work embrace experiments with grapefruit, oranges, and pineapples.

The work with citrus fruits has been largely a continuation of cooperative fertilizer experiments, studies in orchard management, investigations in bud variation, comparison of improved varieties, and the testing of various stocks. The conditions for marketing oranges have been given some attention, and the value of care in handling in picking and in transit has been demonstrated. The mango plantings of the station have been increased by importations from a number of countries. Methods of propagation, testing of seedlings of different varieties, cultural methods, and investigations on handling and shipping of fruit have been continued. Ten of the superior imported varieties fruited at the station during the past year, and all the fruits were of good quality.

Testing of cover crops for coconut groves and a cooperative experiment on the fertilization of coconut groves, which experiment occupies 8 acres, have been begun, and in addition the subjects of cultivation, selection, nursery propagation, etc., are being given attention. Variety testing, experiments in fertilization, planting, cultivation, etc., are being carried on with yams, yautias, dasheens, and sweet potatoes. The sweet potato thus far has proved only fairly prolific, though the tubers have been of good quality. The other crops mentioned are very thrifty and heavy yielders. An experiment in planting various species of Eucalyptus has been begun, duplicating the varieties which during the previous years were set on low, poorly drained land. These varieties have now been planted on higher ground, and while the growth has not been as vigorous as on the low land many varieties which almost failed to grow in the first situation have made good growth on the higher lands.

The chemical work has not included any new problems, but definite progress is reported on all the investigations under way. These include studies on the bat guanos of Porto Rico, the effect of strongly calcareous soils on the growth and composition of various plants, the action of lime in inducing chlorosis in rice, field plat work in connection with a study of chlorosis of the sugar cane, and plat work to determine the fertilizer requirements of red clay soils, and on a number of the investigations the publication of some of the results is promised.

The work in animal husbandry is making encouraging progress. The horses taken down several years ago have attracted a great deal of attention among breeders, and their service is in strong demand. A Morgan yearling colt was obtained during the year by transfer from the Bureau of Animal Industry of this department, and a three-year-old saddle-bred horse was purchased by the station. The number of cross-bred animals in the station herd of cattle is gradually increasing and taking the place of native stock. These include half-bred Shorthorns, Guernseys, and Jerseys, and will form a nucleus of a dairy herd. Owing to the lack of equipment and funds it has been impossible to carry on experimental work in dairy development, and the investigations thus far have been confined to the handling of milk in a sanitary manner. About 100 calves have been obtained during the year from the half-bred Zebu bulls, and there is a strong demand for them. These calves are much larger, hardier, and make more rapid growth than pure native-bred calves. The station's work with hogs was interrupted by the complete destruction of the herd by an infectious disease during the year. The work with poultry has been continued with satisfaction. In connection with live-stock development the introduction of a larger variety of forage crops is considered essential, and experiments are in progress to develop a grass that will produce good hillside pasture and which is drought resistant. Among the new introductions of forage plants which give promise of having considerable value are the molasses grass (*Melinis minutiflora*), Rhodes grass, and *Paspalum dilatatum.*

The plant pathologist has been giving especial attention to diseases of the coffee plant, and particularly to one that has been suspected as being harbored by coffee shade, passing from that to the coffee tree. A study has been made of a disease which attacks the coffee berry, and the fungus causing it has been definitely determined. A new disease which attacks the trunk of the tree has been partially worked out. A bud rot of the coconut different from any hitherto reported has been found, and inoculation experiments have demonstrated the ability of the organism in question to produce the disease. A canker disease of cacao has been discovered, and inoculation experiments show that it is caused by the same fungus as that occurring in Surinam. A study has been made of the so-called banana disease, and numerous inoculations have been made with an organism which is considered parasitic, but without positive results. The effects of soil disinfection and the use of fertilizers on this disease are being tested. Some work is being carried on on the gummosis of citrus trees, anthracnose of grapefruit, etc.

The entomologist during the past season began studies of coffee insects and the mango fruit fly (*Anastrepha* sp.). The propagation and distribution of beneficial insects and fungi has been continued, and a colony of Aphis-feeding ladybirds (*Hippodamia convergens*) introduced. Work in bee keeping has been continued, and experiments are being made with cement for use in the construction of stands, bases, and brood chambers for bees. A tachinid parasite of the adult May beetle has been found abundant in coffee plantations, and this parasite is being propagated by the station for distribution.

In order to facilitate the work of the station the insular government has set aside for the use of the station 200 acres of land about a mile from the present station site, and this will be largely devoted to fruit growing.

The efforts of the station to aid in the establishment of new industries and the development of others that were formerly of comparatively little importance seem to be meeting with success.

GUAM STATION.

The completion of the new office building has made it possible to better systematize the work of the Guam station, and the additional space has enabled the installation of a very complete system of files and records and given room for the growing reference library. A storehouse for the protection of the farm tools has been erected, and also a barn for the accommodation of the live stock.

The governor of Guam, G. R. Salisbury, ceded to the station for its use a tract of about 130 acres of land adjoining that purchased in 1910. Much of this land is rough and rolling and sparsely covered with native grasses. Some is capable of cultivation, while most of the tract can be used for pasture. It represents a type of land that is of considerable extent on the island, and any successful experiments carried out on this tract will be of wide application.

The successful introduction of improved live stock has been one of the most important features of the work of the Guam station. In September, 1911, 6 Morgan horses, 5 Ayrshire cattle, 4 Berkshire hogs, and 8 each of Barred Plymouth Rock and Brown Leghorn chickens were shipped from Seattle by Government transport. After a voyage of about a month they were landed in Guam in good condition. As a precautionary measure all animals were placed in quarantine for a short period, after which they were transferred to the station, where they are to be used in an attempt to improve the live stock of the island. Unfortunately the oldest bull died about a month from the time of landing. He exhibited some of the symptoms of tick fever, but was the only animal so affected. It was believed that the Australian cattle tick (*Margaropus annulatus australis*) was present on the island, but nothing was known regarding its being infected with the organism causing tick fever. The other animals are all reported in good condition and thriving on forage produced on the station.

The field and garden work has given better results than during previous years, due probably to the better condition of the soil as a result of continued cultivation. In the field crop work an experiment with maize is receiving most attention. Corn constitutes a staple food for the people of Guam, and as there are comparatively large areas where corn can be grown the extension of its cultivation is believed to be highly important. A large number of varieties of corn have been secured from tropical countries, and these will be compared with the kinds commonly grown on the island. A strain of Mexican June obtained from Manila has already given higher yields than the native variety, but the grain does not retain its vitality as long. The forage-plant problem seems to be solved. It has been demonstrated that sorghums, Kafir corn, etc., can be readily grown, and this part of the experiment has been reduced in area. Among the grasses introduced by the station, Para grass (*Panicum molle*) has proved by far the best for planting where the soiling system of feeding is followed. From 25 clumps of roots introduced in 1910 the station has now more than an acre planted and has distributed several wagonloads of roots to ranchers for planting. *Paspalum dilatatum* and Guinea grass (*Panicum maximum*) are both giving satisfactory results, and either would be an important acquisition were it not for the fact that the Para grass has proved to be a better and more adaptable species. Other field crops, among them a number of species of leguminous plants, are receiving attention, the pigeon pea, jack bean, and peanut being worthy of note. Their introduction will not only furnish human food, but also forage, and aid in restoring fertility to the soil.

Vegetables have almost without exception produced better yields and the product generally has shown an improvement in quality. The experiments with vegetables have included a large number of varieties, seed of which have been sown at different times of the year in order to determine the most advantageous time for planting. The interest in gardening is increasing, if one may judge from the applications for seeds, and so far as possible the requests have been complied with.

The work with tropical fruits is being rapidly extended. The pineapples introduced from Hawaii have shown such pronounced superiority over the native sorts that all available plants have been distributed and 1,000 suckers ordered from Honolulu for further distribution among planters. Other introductions that have not yet fruited include oranges, lemons, pomelos, Japanese persimmons, peaches, bananas, sapotas, grapes, etc. In addition a number of palms, rubber trees, ornamental, and hedge plants have been introduced and are now growing on the station grounds. The avocado seedlings, introduced from Hawaii since the American occupation, have fruited and the quality of the fruit is said to be equal, if not superior, to those grown in the Hawaiian Islands.

During the past fiscal year Mr. D. T. Fullaway, entomologist of the Hawaii Experiment Station, was detailed to Guam and a preliminary survey was made of the insect fauna of the island, especial attention being given to the pests of economic plants. A large number of specimens were collected, the most of which have been identified and reported upon in the annual report of the Guam station. Through the efforts of Mr. Fullaway attempts are being made to introduce predaceous and parasitic insects for the control of some of the most common pests of the island. This work will be continued in cooperation with the Hawaii Experiment Station.

IRRIGATION INVESTIGATIONS.

Dr. Samuel Fortier had charge of the irrigation investigations of the office and continued the work during the year along the same general plans as outlined in former reports.

As heretofore, the chief work of the office has been the furnishing of information to prospective settlers regarding irrigation methods and practices and the conditions in different localities where irrigation is practiced, and the rendering of advice and assistance to those who have already established homes in the irrigated sections. The greater part of the time of 25 men employed throughout the year and as many more employed only during the irrigation season has been spent in traveling about throughout the arid and semiarid regions collecting data; advising settlers regarding the better irrigation methods and practices; demonstrating the more economical ways of obtaining, distributing, and applying water; and aiding both individuals and the officials of irrigation enterprises in every way possible in solving the practical problems of irrigation. The value of such work can not be estimated, as the improved method adopted by a single man to-day becomes the common method of a locality a few years hence. An idea of the urgent need of this line of work both at present and in the future is shown by the results of the irrigation census taken in 1910 by the Bureau of the Census in cooperation with this office. The decade from 1899 to 1909 was one of great activity in the settlement of irrigated lands, the number of irrigated farms having increased more than 50,000, and the area irrigated in the arid and semiarid States having increased from approximately seven and one-half million acres to thirteen and three-fourths million acres. The enterprises, however, reported that on July 1, 1910, they would be able to supply water to nineteen and one-half million acres and that the projects in operation and under construction included more than 31 million acres. Thus, if the acreage irrigated for irrigated farms remains the same during the next 10 years, and if no new projects are undertaken and only two-thirds of the area in projects but not irrigated in 1909 is brought under irrigation, approximately 130,000 farms must be settled and irrigated, and these largely by persons knowing nothing of irrigation and often but little of farming of any kind.

The severe and widespread drought during the summer of 1911 gave a great impetus to the interest in irrigation which has been steadily growing in the humid and semiarid regions. The office has been flooded with inquiries regarding the possibilities of irrigation, the cost of supplementary irrigation, and the irrigation methods best adapted to conditions where crops can usually be grown without irrigation. The number of men who have been available for work in this field has been limited, and, as a result in the majority of cases, only general advice and bulletins could be furnished inquirers. The cooperative experiments and demonstrations in Wisconsin, New Jersey, Alabama, Florida, and Georgia have been continued and additional ones begun in Minnesota and Maryland. The results in each of these States have more than met expectations. A special endeavor has been made to ascertain the advantages and possibilities of overhead spray systems and subirrigation systems for the irrigation of truck and small fruits and to work out improvements and modifications of the common western irrigation methods with a view to adapting them to eastern conditions and making the irrigation of crops other than truck and small fruits profitable in the humid sections.

The call for information pertaining to pumping and the storage of water has continued to increase. Two bulletins were prepared for publication during the year upon the storage of water for irrigation. The agents of this office stationed in Arizona, California, New Mexico, Texas, Washington, and Kansas have devoted a considerable part of their time to collecting data and advising settlers in regard to pumping and power for irrigation purposes. A pumping plant has been established at Garden City in cooperation with the State of Kansas for the purpose of investigating the possibilities of the cost and returns of irrigation by pumping in the Great Plains region.

The demonstration farms at Davis, Cal.; Gooding, Idaho; Newcastle and Cheyenne, Wyo.; and Eads, Colo., were continued, as were also the investigations in Colorado, Utah, Washington, Arizona, and New Mexico, to determine the effects of irrigation upon orchards. The results of the experiments to ascertain the evaporation losses from irrigated soils were published during the year and the equipment formerly used in these experiments has been used in conducting investigations to determine the amount of water required by alfalfa and wheat at different stages of their growth.

The collection of data and the experiments and investigations pertaining to the irrigation of rice have progressed to a point which makes it possible for the agents in that field to render much advice and assistance to rice growers in meeting the problems peculiar to the irrigation of that crop.

The increased cost of water has made the subject of measurement of water one of vital importance. With a view to determining the accuracy of different measuring devices and the coefficients in different hydraulic formulas and also to determine the effects upon the accuracy of measuring devices of the different conditions under which they commonly operate in practice, an arrangement was made with the Colorado Experiment Station near the end of the year whereby a system of reservoirs was constructed and equipped for making tests of measuring devices and the flow of water through pipes and orifices and over weirs of different kinds.

The most important special investigation carried on during the year has been that of the irrigation resources and possibilities of the State of California. This work was carried on under a cooperative agreement with the Conservation Commission of that State whereby $17,500 was placed at the disposal of this office for the purpose of collecting data and preparing a report upon irrigation resources and possibilities of the State for the 1913 session of the California Legislature. Most of the data for this report has been collected and the report will be prepared and published during the fiscal year 1913.

Three bulletins, one setting forth results of the evaporation experiments and two upon the subject of storage of water for irrigation, and one article on irrigation in the humid sections have been published during the year. Three of the remaining five bulletins on irrigation in the different States have been completed and a revision has been made of two other bulletins of this series. Data have been collected for the preparation of three more bulletins to be included in the practical series on the irrigation of different standard crops.

Regular agents have been assigned during the year to the States of Nevada, Nebraska, Montana, Oregon, and Wyoming and one assistant has been added in the Washington office.

WORK FOR THE FISCAL YEAR 1913.

The work during 1913 will be carried out along the same general plan as in 1912 and all the main lines of investigations will be continued. The chief work of the office will continue to be the advising and assisting settlers and the officers of irrigation enterprises. Special attention will also be given to the investigations pertaining to seepage from canals, evaporation from ditches, and irrigated soils, pumping, the duty of water, and the organization, management, and operation of irrigation enterprises and canals.

Investigations for determining the water used by crops at different stages of their growth will be continued. The several demonstration farms will be maintained with the exception of that at Eads, Colo., which will be abandoned in order that the agent formerly in charge may spend his time personally advising irrigators in eastern Colorado and adjacent sections.

In accordance with the provision in the appropriation bill, an investigation will be made and a report prepared and presented to Congress upon the feasibility and economy of irrigation by the reservoir plan in western Kansas and western Oklahoma. The data collected in cooperation with the Conservation Commission of California will be put into several reports and published as early in the year as possible. As broad and as complete a set of experiments as the time and force available for such work will permit will be carried out at the hydraulic laboratory at the Colorado Experiment Station at Fort Collins.

A cooperative agreement has been entered into with the Arizona Experiment Station providing for an investigation of the irrigation possibilities of that State and the work during 1913 will consist of duty of water investigations in the Salt River Valley and other localities in Arizona. Under the cooperative agreement with the Colorado Experiment Station, a duty of water investigation will be begun in San Luis Valley.

It is planned to publish one or more bulletins during the year upon pumping and upon irrigation in the humid sections. An attempt will be made to complete the series of bulletins upon irrigation in the several States and the practical series upon irrigation of different standard crops. A series of publications will be begun upon irrigation structures of different kinds and another upon the organization, operation, and management of canals and irrigation enterprises. Revisions will be made as rapidly as possible of the bulletins already issued upon irrigation in several States.

WORK FOR THE FISCAL YEAR 1914.

All the lines of work that have been begun, or which will be started during 1913 and have not been finished by 1914, will be continued during that year. So far as possible, one or more agents will be assigned permanently to each of the arid and semiarid States and the field force in the humid and rice growing regions and also that working on pumping and power will be increased. The plan of supplying practical information to settlers by means of bulletins, lectures, demonstrations, and the personal advice of agents will be continued. The chief aims of the work will be to bring about a reduction in the cost of obtaining water by pumping and storage; to encourage a more economical use of water, by demonstrating better methods of distributing and applying water and conserving it in the soil; to reduce the losses of water due to seepage, evaporation, and irrigation at times when the application of water does little or no good to crops; to bring about a better understanding of the conditions in and the possibilities of different irrigated sections: and to encourage a better organization of irrigation enterprises, better methods of managing and operating canals, and a better enforcement of the existing irrigation codes of the several States.

DRAINAGE INVESTIGATIONS.

Mr. C. G. Elliott continued in charge of drainage investigations until February 3; at the close of the fiscal year his successor had not been appointed, Dr. E. W. Allen, assistant director, being temporarily in charge.

During the past year the unfinished projects of the year previous have been completed and many new projects and investigations taken up. A summary of the work done embraces surveys, working plans and profiles, and reports made for various drainage districts, which may be classed as follows:

DRAINAGE SURVEYS.

I. *Reclamation of lands subject to overflow, as by floods.*—Georgia: Big and Little Curry Creeks (Jackson County).

II. *Reclamation of lands continually wet—swamps, marshes, etc.*—Arkansas: Cypress Creek drainage district (Desha and Chicot

Counties). North Carolina: Beaver Dam Swamp (Harnett County), Flea Hill drainage district (Cumberland County). South Carolina: Georgetown Farm Land and Homeseekers Co. tract (Georgetown County). Texas: Jefferson County. Virginia: Pleasant Grove drainage district (Norfolk County).

III. *Improvement of natural watercourses or construction of new channels to provide outlets.*—Maryland: Potomac River bottom lands (Montgomery County). North Carolina: Buffalo Creek (Cleveland County), Little Sugar Creek (Mecklenburg County). South Carolina: Summerville drainage project (Dorchester and Berkeley Counties).

IV. *Farm drainage.*—Georgia: McRae farm (Telfair County). Maryland: Clark farm (Talbot County). North Carolina: Agricultural and Mechanical College for the Colored Race (Guilford County). Virginia: Strathmore Orchard Co. farm (Shenandoah County).

V. *Drainage of irrigated lands.*—Colorado: Arkansas River Valley, Grand River Valley, San Luis Valley. Idaho: Various projects distributed over the State. New Mexico: Pecos Valley. Texas: Rio Grande Valley. Utah: Numerous projects scattered over the State. Washington: Yakima Valley, Moxee Valley. Wyoming: Big Horn Basin (including Grey Bull Valley), Shoshone Valley.

PRELIMINARY EXAMINATIONS AND CONSTRUCTION WORK.

In addition to preliminary examinations having been made and reports written for all the projects enumerated under drainage surveys, similar examinations and reports have also been made for the following: Alabama: Big Swamp (Lowndes County), Caleebee Creek (Macon County), farm drainage in the prairie section. Florida: Proposed Cedar Lake drainage district (Jackson County). Georgia: Appalachee River (Gwinnett County), Little Satilla River and Red Cap Swamp (Camden and Glynn Counties). Idaho: Mason Creek (Canyon County). Illinois: South Branch of Rock River (Rock Island County). Kentucky: Wet and overflowed land (Jefferson County). Maryland: Dennis Bros. Lumber Co. tract (Worcester County), Dublin Swamp (Somerset County), Marumsco Tax Ditch (Somerset County). Massachusetts: Salt marsh land (Plymouth County). Mississippi: Lappatubba and Oconitahatchie Creeks (Union County), State farm (Sunflower County), Tallahatchie River (Union County), Yocona River drainage district (Lafayette County). Missouri: Locust Creek Valley. North Carolina: Maxwell Creek (Duplin County), Richland Township (Beaufort County), Upper Little River (Harnett County). Oklahoma: Bitter Creek and Duck Creek (Kay County). South Carolina: Black and Boggy Swamps drainage district (Hampton County), proposed Broad Swamp drainage district (Williamsburg County), proposed Fishing Creek drainage district (York County). Texas: A. W. Gray tract (near Brownsville). Utah: Earl-Ross project (Utah County).

The following projects, for which this office has made surveys and prepared plans, are now under construction by the landowners:

Arkansas: Arkansas State farm (Lincoln County), Crooked Bayou project (Desha County), Curia Creek drainage district (Independence County), Camp Bayou project (Ashley County). Colorado:

Las Animas consolidated drainage district (Bent County). Idaho: Tile drainage systems on farms of F. H. Kernohan, near Nampa, C. F. Eder and W. W. Kinney, near New Plymouth (Canyon County). Maryland: Beltsville Experiment farm (Prince George County). North Carolina: Little Sugar Creek (Mecklenburg County), Back Swamp and Jacob Swamp drainage district (Robeson County), Third Creek (Iredell County). Oklahoma: Deep Fork of Canadian River (Lincoln County). Utah: Various projects distributed over the State. Texas: Ross farm (Cameron County). Virginia: Bechtel farm (York County), Strathmore Orchard Co. tract (Shenandoah County), Arlington Experiment Farm (Alexandria County).

GENERAL TECHNICAL INVESTIGATIONS.

The studies of run-off under various conditions of rainfall, topography, soil, and vegetation, which were undertaken last year, were concluded, although further studies will be made in the next year or two. Experiments were made to determine the practicability of using explosives for ditch construction in various parts of the country and to ascertain the efficiency of windmills for pumping drainage water in the irrigated section of Texas. The investigation of the wet prairie lands of Louisiana was continued, particular attention being given to the methods and cost of draining those lands by means of pumps. A study was made in connection with the Alabama Agricultural Experiment Station of the best methods of underdraining the prairie soils of that State, and several experimental drainage systems were installed. This work is to be continued. The study of special problems involved in the prevention of injury of irrigated lands by seepage and alkali was continued.

DISSEMINATION OF INFORMATION.

The assignment of engineers to permanent field headquarters has rendered them more accessible to personal consultation by individuals and organizations. A large amount of advisory work of this nature was done by these representatives, as also by correspondence with the Washington office. Some of the more important projects in which such assistance was given are the following—Indiana: Patoka River (Pike County). Missouri: Crooked River (Ray County), Locust Creek (Linn County), Wyaconda River (Clark County). Nebraska: Nemaha River project (Johnson County). North Carolina: Mattamuskeet drainage district No. 1 (Hyde County). Tennessee: North Fork of Forked Deer River (Gibson County).

WORK PLANNED FOR THE FISCAL YEAR ENDING JUNE 30, 1913.

Special attention will be given to farm drainage, the growing interest in this form of improvement having resulted in largely increased demands upon the office for assistance in work of this nature. The placing of field engineers in permanent headquarters has made it possible to conduct preliminary examinations more conveniently and economically, and an increased number of such examinations will be made. The practice of assisting engineers in the solution of drainage problems in particular projects will be continued. In especially representative projects, surveys and plans for reclamation of swamp and overflowed land will be undertaken. In the field of technical investigations the study of underdrainage under various conditions of soil will be continued. Experiments will be made to derive the proper coefficients to be used in determining the capacity of drainage channels under working conditions, and the subject of maintenance of drainage ditches will be studied. In the irrigated section the problems of seepage and alkali will be investigated along the same lines as in past years, several engineers devoting their entire time to this field.

WORK PROPOSED FOR THE FISCAL YEAR ENDING JUNE 30, 1914.

It is expected that the work will follow the same general lines that have hitherto seemed to produce the best results with the available means. More prominence will be given to the drainage of small agricultural tracts.

NUTRITION INVESTIGATIONS.

Dr. C. F. Langworthy continued in charge of these investigations.

During the year work already under way regarding the nutritive value of animal and vegetable foodstuffs has been continued and some new lines of work have been taken up. Particular attention has been paid to the relative ease of digestion of cheese and to methods of preparing and serving cheese, with the result that a Farmers' Bulletin on the economical use of cheese has been published. This and other similar work was undertaken with the object of supplying data which will enable the housekeeper to use her food resources economically and at the same time provide a diet that is reasonable from the standpoint of nutritive value and pleasing in quality. Particular attention has also been paid to the relative nutritive value and use of green and succulent vegetables and to the nutritive value and methods of preparation of corn meal, this work supplementing earlier studies of a similar nature.

Studies of the digestibility of culinary and table fats have been undertaken with a view to accumulating data needed in connection with problems under consideration by the department. In connection with this work methods of preparing fats in such a way that large quantities of fat could be taken in palatable form have been studied.

Preliminary tests having shown that vegetable products (ripening bananas) could be studied to great advantage with the respiration calorimeter, an instrument of suitable size and particularly adapted for such kinds of work has been constructed. New controlling and recording devices have been used, so that this apparatus is very largely automatic in operation with respect to energy measurements. Tests already undertaken show that not only is the instrument very accurate and easy of operation but that it is particularly well suited to the uses for which it is designed. A microrespiration calorimeter has also been devised for studying, with small quantities and in detail, matters which relate to other questions under investigation.

During the year 1913 it is proposed with the large calorimeter to continue studies of the relative ease of digestion of animal and vegetable foods, and with the small calorimeter to continue the study of the changes which take place during the active ripening of fruits. It is apparent that the small calorimeter will prove equally useful for the study of a great variety of problems pertaining to the ripening, handling, and storage of vegetable foods, and that it offers equal opportunity for the study of problems of the handling and curing of animal products. It is proposed to undertake studies of such questions in cooperation with other bureaus in so far as such work will further the plans of the department. In connection with the digestibility and nutritive value of culinary and table fats, it is proposed to study ways of using fats in the dietary, to insure good quality, palatability, and economy with respect to these important foodstuffs. A bulletin has been prepared on the use of mutton and its value as food which describes many ways of preparing and serving this important flesh food. A bulletin is being prepared on the kitchen and its convenient and efficient equipment, which is designed to lessen labor and save the housekeeper's time and strength.

For the year 1914 it is proposed to further develop the very important lines of work referred to above in connection with the new respiration calorimeter. It is also proposed to continue the study of the relative ease and thoroughness of digestion of common food products and related work. Particular attention will also be paid to rice and its use in the diet, to the nutritive value and use of dried fruits, such as raisins, Zante currants, figs, etc., and to the nutritive value and use in the diet of honey, such studies being undertaken with a view to preparing short popular bulletins.

The office is continuing its important advisory functions in aiding the teachers of home economics to make their courses of instruction more effective and the managers of public institutions to arrange more economical and satisfactory dietaries. The use of the numerous publications of the office on different foods in schools and households is very extensive and constantly increases.

REPORT OF THE DIRECTOR OF THE OFFICE OF PUBLIC ROADS.

U. S. Department of Agriculture,
Office of Public Roads,
Washington, D. C., November 4, 1912.

Sir: I have the honor to submit herewith the report of the Office of Public Roads for the fiscal year ending June 30, 1912, and also an outline of plans for the current year, as well as plans and recommendations for 1914.

Respectfully,

L. W. Page,
Director

Hon. James Wilson,
Secretary of Agriculture.

WORK OF THE YEAR.

During the past fiscal year the Office of Public Roads continued to build object-lesson roads and also constructed two experimental roads. In all, it built 722,855 square yards of roadway, which is equivalent to 88 miles of 14-foot road. The total cost of all such roads was $91,877.

Inspection has been made by engineers of the office on 24 of the previously constructed object-lesson roads to determine their condition, their maintenance, and the service which they perform.

The office has supplied advice through its engineers and experts for model systems of roads in 24 different counties. Such work requires an investigation of the entire road situation. All questions concerning existing and proposed locations, materials and methods of construction, maintenance, and administration must be carefully studied. A detailed report containing the findings of the engineer is submitted to the local authorities and must contain all data necessary for future road work.

For the purpose of giving proper advice and instruction on specific road problems 112 assignments of engineers, experts, and chemists were made in 23 States and the District of Columbia.

Six hundred and sixty-nine samples of road materials were received and tested in the physical, chemical, and petrographic laboratories. These materials included 471 samples of rock and gravel and 198 samples of oils, asphalts, tars, and other bituminous materials.

In addition to the routine testing of road materials the work of testing oil-mixed concrete has been continued. A large number of full-sized arch culvert sections also were tested in order to obtain data of value in their design. Research work on the expansion and contraction of concrete has progressed favorably and promises useful and valuable data. This work will be continued during the current year both in the laboratory and in the field.

In addition to the routine operations of the chemical laboratory, research work for standardizing the tests of bituminous materials and for determining the effect of exposure on various types of such materials has been in progress.

In the petrographic laboratory quantitative analyses of 85 rock samples, and qualitative analyses of 38 samples, together with chemical and mineralogical analyses of 301 samples, have been made.

Economic investigations, started in 1910, to obtain reliable information as to the benefits of improved roads, were continued in 12 counties in different parts of the United States. An investigation was also started to determine the amount of bonds issued for road purposes in the various counties in the United States and to develop other pertinent information on this subject.

An experiment was conducted on an 8-mile stretch of road in Alexandria County, Va., to determine the feasibility of the patrol system in the maintenance of earth roads.

In order to keep in close touch with road matters, the office has engaged collaborators in 42 States, to report once a month, or when requested.

The office has continued its policy of cooperation with the railroads in running road-improvement trains throughout the country. The trains were equipped with a lecture car and an exhibit car, which was supplied with models from this office. The models were constructed to represent the various standard types of road and bridge construction. Similar sets of models were loaned to various State fairs and expositions, and lecturers were assigned to accompany them. Experts were also assigned to demonstration trains on the Norfolk & Western and the Missouri, Kansas & Texas Railroads.

The total number of addresses and lectures delivered by representatives of the office numbered 1,135 during the year. In 1911 the number of lectures was 723 and in 1910, 523. The total attendance at the meetings during the past year was 208,472. In 1911 it was 200,000.

A statement of the different kinds of work performed by the office follows.

OBJECT-LESSON AND EXPERIMENTAL ROADS.

The object of the work under this project is to give practical instruction to local road builders in the standard methods of construction and the use of new materials. This office furnishes at Government expense, when requested by local officers, one or more engineers to make the necessary surveys, estimates, and specifications, supervise construction, and give practical instruction. The local authorities must furnish all machinery, materials, and labor. Before undertaking work in any community the officials having jurisdiction over the road to be improved are required to make application to the office on a form provided for that purpose. During the fiscal year ending June 30, 1912, 32 object-lesson roads were supervised by representatives of the office, and may be classified according to materials of construction as follows: One plain macadam; 1 plain macadam with oil surface treatment; 3 gravel; 7 earth; 16 sand-clay; 1 gravel-clay; 2 bituminous macadam, 1 of which was surfaced with asphaltic oil; and 1 macadam road at Clarksville, Tenn., on which only the preparatory work was done. More details concerning this road will be given in the next annual report. In addition, the office supervised the concrete work for 3 bridges with spans of 80 feet, 16 feet, and 10 feet, respectively. One other object-lesson road was not finished and two more are not yet reported. The total cost of the work, exclusive of the salaries and expenses of engineers furnished by this office, was, as has been given above, $91,877.

The following table is given to show the number of square yards of each type of road constructed during the fiscal years 1905–1912, inclusive:

Object-lesson roads constructed during 1905–1912, inclusive.

Material.	1905	1906	1907	1908	1909	1910	1911	1912
	Sq.yds.	*Sq.yds.*	*Sq. yds.*	*Sq. yds.*	*Sq. yds.*	*Sq. yds.*	*Sq. yds.*	*Sq.yds.*
Oil asphalt-gravel							900	
Asphalt-slag							578	
Macadam	44,914	51,246	76,376	72,587	96,107	50,333	11,339	14,896
Gravel	8,894	4,197	11,722	4,608	65,793	71,376	59,942	13,057
Shell	5,877	933		14,020	1,630			
Earth		12,132	27,042	85,967	319,456	651,169	140,933	556,663
Sand-clay	19,178	19,443	85,571	42,634	205,032	177,960	218,177	103,876
Burnt clay	400			3,392	2,041			
Bituminous macadam						45,832	41,551	31,453
Oil-gravel						4,819	9,774	
Concrete						1,004		
Slag						4,610		
Brick						526		
Oil-mixed concrete							1,917	
Total	79,203	87,951	200,711	223,208	690,059	1,007,569	485,102	722,855

BITUMINOUS MACADAM ROADS.

SILVER SPRINGS, MD.—A bituminous macadam drive 2,776 feet in length from Silver Springs station westward to the Blair estate was built between June 17, 1911, and September 5, 1911. The work was interrupted 6 days by unfavorable weather. The country is rolling. The natural soil is loam from station 0 to station 8, and clay and gravel from station 8 to station 27+76. The earth surface was loosened with spikes and picks. The maximum grade of 8½ per cent was reduced to 5½ per cent. Five 6-inch drains, having a total length of 210 feet, and one 4-inch drain 18 feet long were laid. A 10-ton roller was used on the work. The maximum haul for excavation was 200 feet, and the average haul from car to road, 2,500 feet. Broken stone was shipped by rail 49¾ miles, and water for sprinkling was hauled about 1,000 feet.

Limestone of good binding and fair wearing qualities was used for both foundation and surfacing material. Subgrade to the extent of 4,656 square yards was prepared for surfacing. The road was surfaced 12½ feet wide for a distance of 2,776 feet. The total width of the finished roadway was 18 feet. The bottom course of compacted stone was 4 inches and the top course from 2 to 2½ inches, making the total depth from 6 to 6½ inches. The sizes of stone in the bottom course vary from 1 inch to 3 inches; in the second course from 0.5 inch to 1½ inches[1]; in the third course from ½ to ¾ inch; and in the fourth course from dust to ½ inch.

The subgrade and bottom course were built as in the case of water-bound macadam roads. After the No. 2 stone had been placed and rolled, 1½ gallons of bituminous material were applied in a thin sheet, by steam pressure, from a tank wagon, which was fitted with a flexible hose and nozzle, thus giving a very uniform application. On this surface screenings from ½ to ¾ inch in size were spread in sufficient quantity to prevent the bituminous material from sticking to the wheels of the roller. Another application of 0.6 gallon of bituminous material was then applied, and on this ½-inch screenings and dust were spread to a depth of ½ inch and again rolled. The bituminous material was heated in a tank car equipped with steam coils. The steam was supplied by a portable boiler rented for this work. The amount of earth excavated was 700 cubic yards, and the amount of surfacing material 1,119.88 cubic yards.

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[1] Considerable dust unavoidably occurred in this course.

The principal items of cost were as follows: Superintendence, $137.50; grading and shaping, $404.28; drains, $85.87; surfacing material delivered on railroad siding, $1,090.68; surfacing material hauled from the quarry, $65.58; teaming from railroad to road, $268.60; spreading the surfacing material, $81.16; and rolling, including coal, repairs, etc., $251.21.

PHOENIX, ARIZ.—The Central Avenue Boulevard runs northward from Phoenix through level country to the Arizona Canal. For a distance of 3,250 feet, built in 1910, this road was described in the annual report for that year, but the work was not finally completed until March 11, 1911.

The continuation of the work comprised two sections—one beginning ¼ mile south of the northern city limits and extending for ¾ mile; and the other, connecting with the work done in 1910, 2½ miles long. The width surfaced was 16 feet.

The county furnished a road grader, plows, Fresno scrapers, a 10-ton gasoline roller, and an oil atomizer equipped with a gasoline engine.

The soil varies from adobe to gravelly loam, and the excavation of only 250 cubic yards was necessary. The subgrade was irrigated and allowed to dry before shaping. The stone used in this work was crystalline schist, quarried and hauled from a point 2 miles from the northern end of the work. The bottom course was built with stone from 1¼ to 3 inches in size, placed and rolled to make a compacted depth of 4 inches in the center of the road and 3 inches on the sides. The second course contained stone from ¾ inch to 1¾ inches in size, placed to make a compacted depth of 2 inches in the center and 1½ inches on the sides after rolling.

The second course was covered with screenings not exceeding ¾ inch in size and including dust, which was then sprinkled with water and rolled. After the binding course had become dry, the surface was swept with wire brooms to remove all loose particles. An asphaltic oil was used for surface treatment, and the oil was heated in tank cars with steam from a traction engine. During cold weather it was found necessary to reheat it immediately before applying.

An atomizer was used for distributing the oil. The first application of ⅝ gallon per square yard was covered with sufficient screenings to prevent sticking to the wheels of the roller during the rolling process. A second application of ⅜ gallon per square yard was made on the following day, and this was likewise covered with screenings and rolled. Traffic was allowed on the road immediately.

On the ¾-mile section coarse wash gravel from the irrigation canal was used instead of screenings, and the earth shoulders on this section were oiled 8 feet wide on each side at the rate of 1 gallon of oil per square yard. The No. 2 course of 500 feet of the northern end of this section was built of calcareous rhyolite tuff, locally called "caliche." This material was very hard when compacted and less penetration of oil was obtained.

Not including the work described in the 1910 report, the principal unit prices were as follows: Excavation, $62.50; quarrying and hauling stone, 6,664 cubic yards, at $2.06 per cubic yard, $13,727.84; oil delivered at railroad siding, $2.10 per barrel; contract price for spreading oil, $0.407 per barrel, and for heating, $0.30 per barrel; gravel used in place of screenings, $1.50 per cubic yard; spreading screenings and sprinkling, $0.20 per cubic yard; shaping subgrade, $0.025 per square yard; and conveyance of engineer, $200. The total cost, including one-third the cost of equipment for depreciation, was $24,950, which, on the basis of 30,595 square yards surfaced, is equivalent to $0.815 per square yard, or $7,650 per mile. Labor cost $2.25 for 10 hours; and teams, $4.50.

Including the work done in 1910, the various items are as follows: The work was begun on February 15, 1910, and completed on March 11, 1911; the length was 3.875 miles; the width, 16 feet; the area surfaced, 36,375 square yards; the area of the shoulders, 13,786 square yards; the area graded, 90,937 square yards; and the stone used, 8,100 cubic yards. The principal items of cost were: Machinery, $2,922.73; stone, $9,187.44; quarry site, $850; tools, $700.15; roller repairs, $850; office expenses, $373.94; and labor, oil, etc., $17,440; making a total of $32,324.26. After deducting two-thirds the cost of machinery and tools and leaving one-third for the estimated depreciation, the remainder is $29,909.02, which is equivalent to $0.822 per square yard, or $7,718.45 per mile.

MACADAM ROADS.

SUMMERVILLE, GA.—Excavation was started on a road from Summerville northward toward Tryon on August 4, 1911, but it was suspended on August 31, 1911, for lack of funds. The average cut was 0.5 foot and the maximum 3.5 feet; the average fill was 0.25 foot and the maximum 2 feet; and the grade was reduced from 15 per cent to 4 per cent by relocation. For a distance of 10,032 feet the road was graded 30 feet wide, making 33,440 square yards, and the same length was prepared for surfacing 14 feet wide. One mile of road, or 8,213 square yards, was surfaced 14 feet wide. The surfacing material, in which the largest stones were 4 inches in diameter, was spread 8 inches deep in one course and compacted to 6 inches. The crown was made 1 inch to the foot; 2,830 cubic yards of earth was excavated and 1,440 cubic yards of surfacing material was used.

No information was obtainable in regard to the material in a concrete bridge built by contract at Station 42+24. The bridge had a span of 16 feet, a width of 16 feet, and a height of 8 feet. The arch had a rise of 3 feet and a thickness of 8 inches of reinforced concrete. The walls and abutments were 30 inches thick. The following equipment was furnished by citizens: Four wheel scrapers, 1 road machine, 1 four-horse roller, 1 split-log drag, and 2 farm plows. Slat-bottom wagons were used for hauling material. The average haul for excavation was 200 feet and the maximum 500 feet, and the average haul from the pit was 1 mile. The foundation of the road was a sticky red clay, and the surfacing material chert, which was spread with shovels. This material has good binding properties, but wears unevenly under traffic and pulverizes.

The total cost of the work was $1,132.50; the rate per mile of grading was $255; and the rate per mile graded and surfaced, $877.50. Labor cost $1 per day, teams $3, and supervision $2. The principal items of cost were excavation, including supervision, $520; hauling from the pit to the road, $405; spreading, $25; loading at the pit, $77.50; and drilling, $105.

BEREA, KY.—The Chestnut Street road extending westward from Berea post office toward the railroad station, a distance of 1,180 feet, was built in 1910 with a width of 14 feet. When the work was resumed on August 7, 1911, it was found necessary to repair the surface from station 0 to station 5+85 and, in the meantime, the local authorities had decided to widen the surface to 30 feet for its entire length. The section between station 5+85 and 11+80 was found to be in good condition. The widening was done on both sides of the original surface, and the work was entirely completed on September 15, 1911. The natural soil was yellow clay with a subsoil of disintegrated shale rock. The minimum grade was 0.4 per cent and the maximum 3.8 per cent. Fifteen feet of cross drain, made of 4-inch concrete tile, was laid at right angles to the road at station 1+50. A 15-ton roller was rented at $5 per day. Slat-bottom wagons and 1-yard dump carts were used for hauling, and the material was spread upon the road with shovels. The No. 1 course of stone was hauled 19 miles and the screenings were hauled 27 miles by rail, unloaded into wagons, and hauled 2,600 feet. Water was obtained from a hydrant on the work. The material used for surfacing was dolomite and limestone obtained from the Sparks County quarry. This surface is suitable for light traffic only. The road was built to a total width of 30 feet, except from station 0 to station 2, where the width varied from 64 feet to 30 feet. The area graded was 3,234 square yards, and the area surfaced 3,123 square yards. The bottom course was made 2½ inches deep and was filled with screenings, making a total depth of 3 inches. The stone of the bottom course was from ¾ inch to 1¼ inches in diameter, and the screenings from ½ inch to dust. The crown was made ¾ inch to the foot.

The total cost of the work was $946.95; the cost per square yard, $0.293; and the rate per mile, $4,240. Labor cost $1.25 per day, and teams $2.50 per day. The surfacing material, amounting to 415 cubic yards, cost $475 f. o. b. The cost of hauling from cars to road was $165.50, the cost of spreading and sprinkling $70.45, and the cost of rolling $234.50. The roller man worked 21 days at $3 per day, and 23½ days at $5 per day was charged for the roller. The cost of 2.9 tons of coal at $3.50 a ton, 1½ gallons of oil at $1 a gallon, and also the cost of loading, unloading, and freight on the roller, amounting to $39.50, are included in the cost of rolling.

On June 18, 1912, a representative of the office was assigned to do some further work on this road. The section 608 feet in length had failed for lack of drainage (as was predicted previous to the beginning of the work), and on the section 580 feet in length settlement, caused by a center drain, had depreciated the work to some extent. Repairs were made by building side ditches from 2½ to 4 feet deep on the first section, and 250 feet of the second section was resurfaced by picking, cleaning, and filling depressions. After this the whole surface was treated with oil and the work was finally finished on July 20, 1912. The following is a summary of the work done: 967 feet of 4-inch tile drain laid and 3,234 square yards of macadam surface treated.

Ten cubic yards of stone filling around the drain cost $13.85; the drainpipe, $19.34; labor on the drains, etc., $113.83; cleaning the surface, $21.83; 1,500 gallons of crude petroleum, at 4.5 cents per gallon, including placing it, amounted to $68.35. The total cost of repairs was, therefore, $237.20. Labor cost $0.80, $1.25, and $1.50 per day and teams $3 per day.

The work was not finished in a satisfactory manner on account of lack of cooperation on the part of the local officials.

Clarksville, Tenn.—Work on the Hopkinsville Pike, which runs north from Clarksville toward Hopkinsville, Ky., was started on November 27, 1911, at the stone quarry. A crusher and bin were received on December 4, 1911, and excavation was begun on December 7, 1911. The work was carried on until January 9, 1912, and during this time 11 days were lost on account of unfavorable weather.

The equipment consisted of an 8 by 16 inch crusher, with a 30-ton portable bin, elevator, and screen, besides plows and hand tools. The crusher had a capacity of from 8 to 10 tons per hour. Nine hundred cubic yards of limestone were quarried at a cost of $395, and other incidental work made the total cost $424.75. Labor cost $0.50 per day and teams $2.50.

On account of the lack of preparation by the local officials and continued unfavorable weather conditions, no construction work was done during the period that the office was connected with it, excepting 1,075 feet of ditch, but preparations were made for crushing stone, and a local engineer was employed for continuing the work.

GRAVEL ROADS.

Fayetteville, Ark.—Work on the road running westward from Fayetteville toward Mount Comfort was started on November 14, 1911, and completed on December 15, 1911, with 5 days' delay on account of bad weather. The soil for 600 feet was clay loam, for 100 feet sandstone, and for 200 feet red clay.

The equipment consisted of 1 road machine, 1 rooter plow, 1 turning plow, 7 wheel scrapers, besides wagons and hand tools. The average haul was 450 feet and the maximum haul 900 feet. Surfacing material was hauled 1¼ miles from the pit. Clay and loam were used for the foundation and excellent gravel was obtained for surfacing. The gravel was spread by hand. The length of road graded was 900 feet and the width graded 30 feet, making an area of 3,000 square yards. The length surfaced 20 feet wide was 900 feet, making an area of 2,000 square yards. The depth of compacted gravel was 6 inches and the crown was made ¾ inch to 1 foot. The total amount of earth excavation was 1,126.4 cubic yards, of rock excavation 10 cubic yards, and of surfacing material 151.2 cubic yards.

One 6-foot span circular arch masonry culvert 20 feet long, not including the wing walls, contained 25 cubic yards of masonry, requiring 77 bags of cement and 8 cubic yards of sand.

The total cost of the work was $707.13. The cost per square yard was $0.235 and the rate per mile $4,148.49. Labor cost $1.25 per day, teams $2.50 per day, and the principal items of cost were excavation, $315.40; hauling culvert stone, $15; labor on the culvert, $97.19; rock excavation, $3.85; loosening and loading gravel, $60.62; hauling from the gravel pit to the road, $110; spreading gravel, $29.38; cement, $46.20; sand, $14; and lumber, $15.49.

Hattiesburg, Miss.—Between July 26 and November 25, 1911, the main street from Hattiesburg northwest toward Rawls Springs was built of pyrites from phosphate rock and gravel with high cementing properties.

The street was first graded 28 feet wide in cuts and 20 feet wide in fills. For 250 feet it was surfaced 28 feet wide and for 3,180 feet 14 feet wide, making the total length surfaced 3,430 feet and the area surfaced 5,724 square yards.

The natural soil is sandy loam. A grader, plows, slips, picks, shovels, and wagons were used in the construction. The maximum grade of 11.3 per cent was reduced to 3 per cent. The maximum cut was 5.31 feet and the maximum fill 15 feet. Two wooden culverts, one 18 inches by 18 inches and the other 2 feet 7 inches by 2 feet 3.5 inches, and both 22 feet long, were built of of 3-inch and 4-inch plank. The larger culvert was braced with 2-inch by 4-inch posts driven 3 feet into the ground.

A wooden pile bridge was built at one end of the street. The piles were 10 inches square and were driven 11 feet. The bridge was 33 feet long by 19.5 feet wide and 14 feet high.

The average haul for excavation was 500 feet, the maximum 1,400 feet, and the average haul for surfacing material 1 mile. A total of 4,300 cubic yards of earth was moved, and 1,040 cubic yards of surfacing material was used. The pyrites was spread to a depth of 5 inches, and the gravel to a depth of 6 inches. The rolling was done with a reversible roller, and the crown was made 1 inch to the foot. At from $2.50 to $3 for foremen, $1.35 for subforemen, $1.25 for labor, and from $3 to $4 for teams per day, the total cost of the work was $2,308.24. The principal items were $1,315.37 for excavation and embankment, $110.51 for subgrading, $106.09 for trimming the shoulders, $567.12 for surfacing, $37.90 for rodman and tools, $36.73 for the right of way work, $80.12 for the bridge, $9.32 for the culverts, $12.21 for the outlet ditches, and $32.85 for miscellaneous items.

The tools bought for this work were afterwards taken by the city, and all of the material and 25 per cent of the cost of the road was donated, but the cost per square yard surfaced, calculated from the actual cost of the work, would be $0.403, and the rate per mile $3,553.44.

GAINESVILLE, TEX.—A gravel surface 3,000 feet in length was built with a red clay binder at Gainesville, on the Denton Road, between Gainesville and Denton. The work was started on June 19, 1912, and completed on July 15, 1912. The average cut was 0.5 foot, and the average fill 1.5 feet. The grading was done with a road grader and slip scrapers. The maximum grade was 2 per cent. One 12-inch corrugated metal culvert 28.5 feet long was laid with concrete end walls, each 4 feet by 1.5 feet by 1.25 feet. A 3-ton concrete roller and a tooth harrow were used in surfacing. The average haul for excavation was 200 feet, and the distance from the gravel pit was ¾ mile. The total width graded was 40 feet, and the area was 13,333 square yards. The whole length of the road was surfaced 16 feet wide, making an area of 5,333 square yards. The compacted depth of the bottom course was 5 inches, and of the top course 2 inches. The material of the bottom course varied from ¼ inch to 2 inches, and the top course from ¼ inch to 1 inch. The crown was made ¾ inch to the foot. The excavation amounted to 296 cubic yards, and the gravel to 1,087 cubic yards.

The total cost was $474.47, the cost per square yard of area surfaced $0.089, and the rate per mile was $835.08. Labor cost $1.50 per day; hired teams, $2 per day; and county teams, $1 per day.

GRAVEL-CLAY ROADS.

MEMPHIS, TEX.—Work on the river road north from Memphis toward the county line was started on August 29, 1911, and completed on September 11, 1911.

The grading was done with plows, grader, wagons, and drag and fresno scrapers. The maximum cut was 2 feet, the maximum fill 1½ feet, and the maximum grade of 5 per cent was reduced to 3 per cent.

The natural soil is sandy. The average haul was 150 feet and the maximum haul 500 feet. The distance from the gravel pit was 1,400 feet. Gravel was used for the foundation and was covered with 2 inches of clay for surfacing. The total length graded to a width of 30 feet was 1,800 feet. The road was surfaced 16 feet wide for the same distance, and the total area surfaced was 3,200 square yards. The bottom course of gravel was spread 13 inches in depth and the top course of clay 2 inches in depth, making a total depth when compacted of 12 inches. The largest gravel was not over 1¾ inches in diameter. The crown of the surface was made ¾ inch to the foot. The total earth excavation was 490 cubic yards, and the total amount of surfacing material was 1,155 cubic yards.

The cost of the road to the community was $561.08; the cost per square yard, $0.17½; and the rate per mile, $1,650. Labor cost $1.50 per day and teams $3 per day. The principal items of cost were earth excavation, at $0.16 per cubic yard, $77.35; foreman, $27.50; plowing and loading the surfacing material, $230.88; teaming from the gravel pit to the road, $201.75; and spreading, $23.60.

SAND-CLAY ROADS.

DEMOPOLIS, ALA.—Work was started on the Springhill Road south from Reese's Lane toward Linden on May 18, 1911, and completed on July 20, 1911. The length was 4,400 feet, the width of sand-clay surface 16 feet, and the width from ditch to ditch 24 feet. The crown was made 1⅛ inches to the foot. The natural soil for 1,300 feet was a sand-clay mixture, for the next 800 feet sand, and for the remaining distance of 2,300 feet clay. The surface was plowed, moved with a slip scraper, and spread with shovels. The average cut was 1½ feet and the average fill 1 foot. The total area graded was 11,733 square yards, amounting to 2,190 cubic yards of excavation. The maximum grade of 8 per cent was reduced to 4.5 per cent. The average haul for excavated material was 300 feet and for surfacing material from pit 2,600 feet. Both slat-bottom and dump wagons were used. The sand was fine grained, and spreading was done by shoveling from the wagons. Two 18-inch vitrified pipe culverts, each 27.5 feet long, were laid with cemented joints and brick end walls. End walls were also built on a 24-inch vitrified pipe culvert previously laid, making the total masonry yardage 3.9. The surface was shaped with a road machine. Nine hundred and seventy cubic yards of surfacing material was spread from 6 to 9 inches in depth on a subgrade of 7,822 square yards.

The total cost of the work was $1,060.05; the cost per square yard, $0.09; and the rate per mile, $1,275. The foreman was paid $0.20 per hour, men $0.10 per hour, and the teams $0.35 per hour.

MONTICELLO, FLA.—The work on the Ashville Road eastward from Monticello toward Madison was started on August 21, 1911, and completed on October 14, 1911. The country is hilly, with a natural soil of sand and clay. The sand is usually found in the bottom lands and the clay half way up the hill slopes or in ridges across the road. One culvert, 14 inches by 20 inches by 30 feet long, was built of cypress.

The outfit used consisted of a grading machine, 4 plows, 9 wheel scrapers, 4 wagons, 23 mules, and various hand tools. The average haul for excavation was 275 feet and the maximum, 400 feet. The foundation was made of sandy clay and surfaced with a natural mixture of sand and clay having good wearing qualities. The spreading was done with hoes and finished with the grader.

The total length graded was 9,990 feet; the width was 30 feet in cuts and 24 feet in fills; and the area graded, 27,931 square yards. The length surfaced was 8,150 feet and the width 16 feet, making an area of 14,489 square yards. The finished roadway was from 20 feet to 30 feet wide. The depth of surfacing material when compacted was 6 inches, and the crown ¾ inch to the foot.

Earth excavation amounted to 5,260 cubic yards and the surfacing material is included in this amount.

The total cost of the road to the community was $1,398.97; the cost per square yard, $0.0966; and the rate per mile, $906.33. Labor cost $1 per day, and teams without driver, $2.50 per day. The principal items of cost were excavation, $1,016.38; shaping the subgrade, $263.61; loading and hauling the surfacing material, $69.48; spreading the surfacing material, $14.30; and moving the camp and incidental expenses, $27.70.

PALATKA, FLA.—Two sections of sand-clay demonstration road were built at Palatka. Section 1, called the Palatka-Hastings Road, running north from East Palatka toward Jacksonville, was started on February 15, 1912, and completed on February 17, 1912. The work consisted of reshaping the surface, covering it with sand and clay, and thoroughly mixing these materials. The adjacent land is level, the natural soil black loamy sand, and the grade of the road 0.4 per cent. Slat-bottom wagons were used in hauling sand ¾ mile and clay ½ mile. The sand is fine grained, and the clay has good binding properties. The total length graded was 500 feet, the width 16 feet, and the area 889 square yards. The length surfaced was 500 feet, the width 8 feet, and the area 444 square yards. The bottom course consisted of 4 inches of loose sand, the second course 3 inches of clay, and the top course 2 inches of sand, making the total compacted depth 7 inches. The crown was made 1 inch to the foot. One hundred cubic yards of sand and 30 cubic yards of clay were used. The total cost was $44; the cost per square yard, $0.10; and the rate per mile, $465. Labor cost $1.25 per day and teams $4.50 per day.

Section 2, called the Palatka-San Mateo Road, runs southward from the St. John River Bridge toward East Palatka. Work was started on this section on February 19, 1912, and completed on February 24, 1912. The natural soil is sandy. Road machines, a heavy disk harrow, and slat-bottom wagons were used. Similar materials were used and the same methods followed as in building section 1. The total length was 3,000 feet. This section was originally built by contract in 1910, but, on account of an excess of unmixed clay, the road had become badly rutted and the object of this work was to demonstrate the necessity of thoroughly mixing the sand and clay, which had not been done when the road was built. The length of section rebuilt was 3,000 feet, the width 12 feet, the total width of the roadway 20 feet, and the total area surfaced 4,000 square yards. The crown was made 1 inch to the foot. The total cost was $102, and the rate per mile, $180. Labor cost $1.25 per day and teams, $4,50 per day.

TALBOTTON, GA.—Work was begun on November 15, 1911, on a sand-clay road called the Centerville Road, leading from Talbotton toward Centerville, but was discontinued on January 6, 1912, before completion, with the understanding that it would be resumed early in 1912. The material is red clay, containing pipe clay and a small percentage of sand. The foundation was made of nonslaking clay containing some pipe clay, and the surface was of fine, loamy sand. The maximum cut was 4.5 feet, the maximum fill 4 feet, and the grade was reduced from 9 to 4½ per cent. For carrying out the work picks, plows, wheel scrapers, slat-bottom wagons, a disk harrow, and a split-log drag were used. The total length graded was 3,525 feet, the width 30 feet, and the area 11,750 square yards. The length surfaced was 1,950 feet, the width 14 feet, and the area 3,030 square yards. The bottom course was 4 inches of clay and the top course 8 inches of sand. The materials were mixed by continued plowing and harrowing. The crown was made ¾ inch to the foot. The earth excavation amounted to 3,290 cubic yards and the surfacing material to 675 cubic yards. The average haul from the pit was 985 feet, and the material was spread with shovels. Two 16-inch vitrified-pipe culverts and one 18-inch corrugated-metal culvert, each 30 feet long, and also one plank culvert 5 feet by 6 feet were built. The gang on this work consisted of a superintendent, 3 guards, 17 convicts, and 15 mules, and the value of the equipment was carefully estimated to be $6,000.

The cost of the work to the county per month was estimated as follows: Superintendent, $75; 2 guards, $60; 1 guard, $37.50; provisions, $115.90; miscellaneous supplies, $11.97; incidentals, $7.79; hay, at $28 per ton, $56; oats, at $0.635 per bushel, $161.92; ground feed, $34; transportation, freight, etc., $10.19; depreciation on $6,000 at 10 per cent, $60; and interest on the equipment at 6 per cent, $30, making a total estimated monthly cost of $650.27, or, for 25 working days, an average cost of $26 per day.

LIBERTY, MISS.—A sand-clay surface was built on the upper Gloster Road, which runs westward from the junction toward Gloster. Work was begun on August 18, 1911, and completed on September 6, 1911, with 4 days' delay on account of unfavorable weather. The natural soil from station 0 to station 5 is sand; from station 5 to station 12, clay; and from station 12 to station 25, sand-clay. At station 12+90 a 15-inch vitrified-pipe culvert 20 feet long was built, with cemented joints. The total length graded was 2,500 feet, and the width in cuts 18 feet and in fills 20 feet, making the area graded 5,122 square yards. The length surfaced was the same, the width surfaced 15 feet, and the area 3,611 square yards. The finished roadway was made 20 feet wide from station 0 to station 5 and 18 feet wide from station 6 to station 25. The compacted depth of surfacing material was 6 inches, and the crown 1½ inches to the foot. Five hundred and ninety cubic yards of earth excavation was hauled an average distance of 150 feet and a maximum distance of 400 feet. The average cut was 0.7 foot and the maximum cut 1.2 feet. The average fill was 0.5 foot and the maximum fill 1.6 feet. The grade was reduced from 5.8 per cent to 3 per cent. One hundred and ninety-one cubic yards of surfacing material was hauled 2,100 feet from the pit. A road machine and 4 slip scrapers were used. The surfacing material was sand of good wearing quality, containing 10 per cent of gravel.

The cost of the work was $187.81, the cost per square yard $0.052, and the rate per mile $396.25. Labor cost $0.50 for convicts, $1 for hired men, $1 for county teams, and $3 for hired teams. About 50 per cent of the work was done by county and convict labor. The principal items of cost were: Excavation $94.43; shaping the subgrade, $30; culvert pipe, $8.50; labor on the culvert, $2; cement, $0.50; clearing, $4.75; hauling from the pit, $31.25; spreading, $6.30; mixing 1,666 square yards of material, $4.45; and surveying, $2.63.

Brady Island, Nebr.—One mile of sand-clay road was built from Brady Island southeast toward Gothenburg between October 27 and December 11, 1911, with 6½ days' delay on account of bad weather. The country is hilly and the soil sandy. The surfacing was built of a good natural mixture of top soil. The average cut was 2.5 feet and the maximum cut 4.4 feet. The average fill was 1.5 feet and the maximum fill 2.6 feet. The maximum grade was reduced from 8 per cent to 2 per cent. Plows, slipscrapers, fresno scraper, plank drag, grader, concrete roller, disk harrow, and spike and tooth harrow formed the equipment. Slat-bottom wagons were used for hauling. The average haul was 100 feet, the maximum haul 300 feet, and the average distance for hauling the surfacing material from the pit was 0.5 mile. The road was graded for a distance of 5,280 feet, 32 feet wide in cuts and 24 feet wide in fills, making a total area graded of 18,080 square yards. The same length was surfaced 16 feet wide, making an area of 9,387 square yards. The surfacing material when compacted was 5 inches deep in the center and 4 inches on the sides. The crown was 0.5 inch to the foot. The earth excavation amounted to 2,440 cubic yards, and the surfacing material to 1,746 cubic yards.

The work cost $1,188.46; the cost per square yard was $0.1266; and the rate per mile, $1,188.46. Labor cost $1.75 per day, teams $3, and foreman $2.50. The principal items of cost were: Excavation, $345.11; shaping the subgrade, $39.06; hauling from the pit, $622.94; spreading, $65.21; rolling, $4.13; shaping the surface, $28.12; mixing, $4.50; stripping, $65.26; and general expenses, $14.13.

Columbus, Nebr.—A gumbo-sand road running northwest from the Platte River toward Columbus was started on September 18, 1911, and discontinued for the season on October 20, 1911. The first work consisted of excavation and stripping of gumbo pits. The earth was plowed and loaded on wagons, and was also moved with slips, and wheel and fresno scrapers, and spread with shovels or a grader.

The natural soil was sandy loam. The maximum cut was 3½ feet, the maximum fill 1 foot, and the maximum grade of 2.24 per cent was reduced to 1 per cent.

The equipment consisted of 2 road graders, 1 steel road drag, 1 concrete road roller, 1 disk harrow, and 1 spike-tooth harrow, besides plows and scrapers. Eight hundred feet was the average haul for excavation and 1,700 feet the maximum haul. The average distance from the pit was 1 mile.

The material used for surfacing was gumbo silt and Platte River sand. The road was graded 32 feet wide. The total area graded was 11,669 square yards. The length surfaced was 3,282 feet, and the width surfaced 16 feet, making a total of 5,835 square yards. The width of the finished road was 24 feet.

The surfacing was spread in two courses, making a compacted depth of 6 inches in the center and 5 inches at the sides. The crown was made ¾ inch to the foot.

The earth excavation amounted to 1,035 cubic yards, and the surfacing material to 1,750 cubic yards, of which 875 cubic yards was purchased.

The cost of the road to the community was $1,421.68; the cost per square yard of the area surfaced, $0.244; and the rate per mile, $2,287.16. Labor cost $1.75 per day; foremen, $4 per day; and teams, with driver, $3.50 per day. The principal items of cost were as follows: Excavation, $317.07; shaping the subgrade, $24.50; surfacing material, $150; loading the surfacing material, $184.31; hauling the surfacing material, $350.44; spreading, $31.59; rolling, $39.66; clearing and grubbing, $12.25; stripping, $35.10; loading the sand, $28.48; hauling, $112.33; spreading the sand, $19.16; shaping the surface, $53.99; mixing, $38.72; and general expenses, $24.08. The work was not completed during the season on account of heavy rains.

Black Mountain, N. C.—On July 5, 1911, work was started on the road from Black Mountain toward the sanatorium, and after July 8 the work was turned over to the local officials.

The maximum grade of 7 per cent was reduced to 6 per cent. The maximum cut was 2 feet and the maximum fill 1½ feet. The natural soil was clay and the excavation was handled with a road grader and slat-bottom wagons. The average haul was 530 feet and the maximum 1,000 feet The distance from the sand pit to the road was about 2 miles. Both sand and clay contained too much mica to make a good road. The total length graded 22 feet wide was 1,750 feet. A total of 525 feet was surfaced 12 feet wide. The total amount of earth excavation was 265 cubic yards and the amount of surfacing material, 65 cubic yards.

The total cost of the work, including labor on the drag, was $116.63. The cost per square yard was $0.166, and the rate per mile, $1,172.16.

GOLDSBORO, N. C.—The La Grange Road was built from Goldsboro eastward toward Kingston between August 2, 1911, and September 18, 1911. The material from station 0 to station 15 was a hard gray top soil with a black loam subsoil; from station 15 to station 23, sandy top soil and clay subsoil; from station 23 to station 46, a natural sand-clay mixture; from station 46 to station 57, clay; from station 57 to station 59, sand; and from station 59 to station 73, sand with clay subsoil. At station 52, 1,000 feet of road was relocated to improve the alignment. The maximum cut was 18 feet, the maximum fill 6.5 feet, the average cut 0.5 foot, and the average fill 0.6 foot. The grade was reduced from 7.5 per cent to 4.95 per cent. The total length graded was 7,300 feet, the width 30 feet, and the area 24,333 square yards. The surfacing material consisted of natural sand or gravel clay. The length surfaced was 5,800 feet, the width 24 feet, and the area 15,466 square yards, of which 2,133 square yards was surfaced with clay from a pit, and 13,333 square yards with clay taken from the side ditches. The crown was made 0.75 inch to the foot. The excavated material amounted to 5,426 cubic yards, and the following equipment was used: 1 road machine, 4 wheel scrapers, 11 single-horse dump carts, 4 slip scrapers, 1 rooter plow, 1 turning plow, and hand tools. A 30-foot span wooden bridge 20 feet wide was built.

The total cost of the work was $1,199.50; the cost per square yard, $0.049; and the rate per mile, $867.50. Labor was performed by convicts estimated at $0.50 per day, county mules at $0.50 each, and hired mules at $1 each. The principal items of cost were as follows: Excavation, $813.95; shaping the subgrade, $72.50; clearing and grubbing, $40.35; moving fences and poles, $9.20; dragging, $0.95; loading clay, $30; hauling clay, $81; spreading clay, $6; and maintenance of the camp, $82.05. The bridge was built by contract at an estimated cost of $63.50.

HICKORY, N. C.—A sand-clay road running southward from Hickory toward Brookford was started on November 14, 1911, and completed on December 2, 1911. The country is hilly and the soil clay. Excavation was made by plowing, and the material was moved with single-mule slip scrapers and spread with shovels. The grading required no appreciable cuts or fills, and the maximum grade was 5.6 per cent. One 18-inch vitrified pipe culvert, 40 feet long, was laid without end walls. A plank drag was built for the work. The sand used for surfacing was hauled ⅝ mile. The total length regraded was 1,050 feet, with a width of 24 feet. The same length was surfaced 16 feet wide, making the area surfaced 1,867 square yards. The surfacing was 6 inches thick when compacted, and the crown 1¼ inches to the foot. The earth excavation amounted to 135 cubic yards, and the sand for surfacing, 395 cubic yards.

The cost of the work was $198; the cost per square yard, $0.106; and the rate per mile, $995. Labor cost $1 per day, and teams $2.50 per day. The principal items of cost were: Excavation, $25.75; shaping the subgrade, $12.50; labor on the culvert, $4.75; hauling the sand, $105.25; spreading the sand, $17.75; mixing, $5.50; cement, $0.50; and vitrified pipe, $26.

KINSTON, N. C.—A sand-clay road leading westward from Kinston toward La Grange, called the La Grange Road, was graded for a distance of 4,100 feet and surfaced 3,000 feet with a natural sand-clay mixture. The work, performed by convict labor, was started on August 24, 1912, and completed on September 28, 1912. The road was first plowed, and the material was transported in wheel scrapers and wagons, and spread with shovels. The average cut was 0.6 foot, and the maximum grade 1 per cent. The natural soil was black sandy loam unsuitable for mixing with clay. One 24-inch vitrified-pipe culvert 30 feet long, a wooden bridge having a span of 8 feet, and a 20-foot roadway were built. The equipment consisted of a road machine, 2 wheel scrapers, 3 slat-bottom wagons, and 1 plow. The average haul was 200 feet for excavation and 0.66 mile for surfacing material from the pit. The road was graded 30 feet wide, and the area was 13,666 square yards. The width surfaced was 16 feet, and the area 5,333 square yards. The surfacing material was compacted to a depth of 6 inches, and the crown of the roadway made 0.75 inch to the foot. The earth excavation amounted to 699 cubic yards, and the surfacing material 1,185 cubic yards. Labor and material for the bridge cost $15.75.

The total cost of the road to the community was $573.35; the cost per square yard, $0.05; and the rate per mile, $865.92. The superintendent was paid $2 per day; hired teams, $3; and guards, $1. Convicts were figured at $0.40, and county teams at $1 per day.

Moyock, N. C.—The work of building a sand-clay road northwest from Moyock was started on October 19, 1911, and continued until November 17, 1911. The soil from station 0 to station 1 is sand-clay with an excess of sand; from station 1 to station 2, clay; from station 2 to station 10, sand-clay containing an excess of sand; from station 10 to station 15 the mixure of sand and clay is well proportioned; and from station 15 to station 18 there is a slight excess of sand.

The equipment consisted of one 4-horse road plow, 1 disk cutter, 1 disk riding plow, 1 harrow, and a road grader. Some of the material was handled in carts, then dumped and spread by hand, although most of the grading was done with slip scrapers.

The average haul was 50 feet and the maximum haul 1,700 feet. The subsoil was used for a foundation and a sand-clay mixture for the surfacing. The total length built was 1,800 feet with a width of 20 feet, and the crown was made 1.8 inches to the foot. The earth excavation amounted to 352 cubic yards.

The cost of the road was $113.48; the cost per square yard, $0.2837; and the rate per mile, $332.87. Labor cost $1.25 per day, and team, with driver, $3.25 per day. It was very difficult to obtain men and teams.

Warsaw, N. C.—The work of building a sand-clay road from Warsaw southward toward Kenansville was begun on November 4, 1911, but discontinued on December 22, 1911, after 1 mile of road had been built.

The soil is sandy, with a light red subsoil of clay and white sand. The proportion of sand in the subsoil is from ⅔ to ¾, making a good mixture. The surface was first plowed, thereby turning the sand under and bringing the subsoil to the surface. It was then mixed with a disk harrow, shaped with grader and drag, and leveled with slip scrapers where necessary, and material was added from the ditches or nearest clay pits. The maximum cut was 1 foot, the maximum fill 3.1 feet, and the maximum grade of 3 per cent was reduced to 2½ per cent.

One 18-inch corrugated metal culvert 23 feet long, two 18-inch metal culverts each 21 feet long, and two 10-inch vitrified-pipe culverts each 21 feet long were laid without end walls, and a 15-foot span skew bridge was built with brick wing walls 22 feet long and 4.6 feet high above the footings with plank floor and guard rails. The footings were 2 feet deep and 2.9 feet wide. The abutment walls were made 22 feet long, 2 feet thick at the bottom and 1 foot 8 inches thick at the top. The wing walls were built for a 1 to 1 slope.

The maximum haul was 1,000 feet, the average haul, 200 feet; and the average haul from the pit, 500 feet. The total length of road built was 5,280 feet; the width of grading, 20 feet; and the area graded, 11,703 square yards. The surfacing material was spread 14 feet wide, making the area surfaced 8,213 square yards. The surfacing was 8 inches in depth, and the crown 1½ inches to the foot. The estimated amount of earth excavation was 1,914 cubic yards, and of surfacing material 1,200 cubic yards.

Twenty barrels of cement, 5 barrels of lime, 10 cubic yards of sand, 15,500 bricks, 2,074 feet b. m. of pine lumber, and 78 pounds of nails were used in building the bridge.

The total cost of the work was $1.070.25; the cost per square yard surfaced, $0.13; and the rate per mile, $1,070.25. Labor per 10-hour day cost $1.25; foremen per day, $2.50; and mules per day, $1.50.

The principal items of cost were grading, $247.12; shaping the subgrade, $56.25; culverts, including labor, $88.12; abutment walls, including excavation for them, $322.32; loosening and loading clay, $42.49; hauling from pit, $138.19; spreading surfacing material, $24; clearing and grubbing, $53.54; dragging, $10.50; and trimming the shoulders and ditching, $87.72.

Mineola, Tex.—A sand-clay road from Mineola northeast toward Martin's Ferry, called the "Martin's Ferry Road," was begun on November 27, 1911, and completed on January 17, 1912. Nineteen and one-half days were lost on account of cold weather and holidays. The earth was loosened with plows and rooters or with drag and wheel scrapers and spread with shovels. The maximum cut was 2 feet, the maximum fill 4½ feet, and the maximum grade of 5½ per cent was reduced to 3 per cent.

From station 0 to station 21 the natural soil is sandy with a clay subsoil; from station 21 to station 32, the soil is sandy clay; from station 32 to station 41+50, sand; and from station 41+50 to station 58, clay loam.

Three 12-inch corrugated metal culverts each 20 feet long, one 18-inch metal culvert 20 feet long, one 24-inch culvert 20 feet long, and 1 double 30-inch culvert 30 feet long, making 60 feet of 30-inch pipe, were laid with end and wing walls. The end walls were built of brick laid in cement mortar having an average thickness of 12 inches. Wing walls were built at an angle of 30° with the end walls. One road machine, 6 wheel scrapers, 12 drag scrapers, slat-bottom wagons, plows, and small tools formed the equipment.

The average haul for excavation was 250 feet and the maximum 800 feet. The average haul from the clay pit was 1,150 feet and from the sand pit 2,400 feet.

The foundation of the road was made with sandy loam and the surface with a sand-clay mixture containing an excess of clay with fairly good binding qualities. The clay and sand were loosened with a rooter plow and loaded into wheel scrapers. The material was then hauled 700 feet, dumped, reloaded with shovels into carts, and hauled the remaining distance to the road. The surfacing material was spread with shovels.

The total length graded was 5,800 feet, the width 24 feet, and the area 15,467 square yards. The length surfaced was 4,150 feet. The width of surfacing was 16 feet and the area of surfacing 7,377 square yards. The finished roadway was made 20 feet wide. The depth of clay was 8 inches and of sand 1 inch. The crown of the road was made 1 inch to the foot. The amount of earth excavation was 3,820 cubic yards, the amount of clay for surfacing 1,630 cubic yards, and of sand 210 cubic yards.

Eight thousand bricks and 61 bags of cement were used in building the end walls. Fifty pounds of dynamite, 100 feet of fuse, and 100 caps were used in clearing and grubbing 1.8 acres. The bricks cost $9.50 per thousand and cement $0.63 per bag.

The total cost of the road to the community was $1,754.32; the cost per square yard surfaced, $0.115; and the rate per mile, $1,597.04.

Labor per 9-hour day cost $1.50. Labor for shovelers and wheel-scraper work cost $2; foremen, $3; teams for scrapers, $3.50; and teams for hauling, $3.

The principal items of cost were as follows: Clearing and grubbing, $102.92; excavation, $592.32; culvert excavation, 9½ cubic yards, $3.16; hauling and laying pipes, $11.33; metal culverts, $130.40; end and wing walls, $219.78; loosening and loading clay, $179.76; hauling clay, $225.97; spreading clay, $35.93; stripping the clay pit, $22; back filling the clay pit, $45.54; loading sand, $10.75; hauling sand, $57; spreading sand, $6; and shaping the surface, $111.46.

The working force was organized with a foreman in general charge. Local labor and teams were used throughout the work. The clearing and grubbing on about 2,000 feet was very heavy.

ORANGE, TEX.—The building of a section of sand-clay road 5,120 feet long in Orange, Tex., on the lower Beaumont Road, which runs westward from Orange toward Beaumont, was started on May 1, 1912, and completed on May 20, 1912. Three and two-thirds days' work was lost during that time on account of rain. The top soil is black sand and silt, and the subsoil is a stratum of clay varying from reddish to gumbo colored. Below this stratum is a quicksand. The surface of the road before improvement was covered with very fine sand.

In certain sections the clay used for surfacing was taken from the side ditches by means of two-mule slip scrapers, after having been loosened by plowing. The clay so taken amounted to 322 cubic yards. For other sections of the road slat-bottom wagons were used for hauling from the clay pit. The amount of clay hauled from the pit was 989 cubic yards. The grade of the road is very flat. Two cross drains of 15-inch corrugated metal pipe had previously been laid at stations 13+30 and 26+60. The equipment consisted of a road grader, a disk harrow, a split-log drag, 1 large plow, and 2 small plows. The average haul from pit to road was 2,777 feet. The material was spread with shovels. The total length of the road graded was 7,870 feet, the width 36 feet, and the area 31,476 square yards. The length surfaced was 5,120 feet, the width 16 feet, and the area 9,102 square yards. The depth of surfacing material was 7 inches for 1,400 feet and 4½ inches for the remaining 3,720 feet. The crown was made ¾ inch to the foot.

The total cost of road to the community was $1,010.33; the cost per square yard of finished surface, $0.111; and the rate per mile, $1,041.85.

EARTH ROADS.

Mountain View, Ark.—Work was started on July 25, 1911, on the Mountain View road to Sylamore. The country is very hilly and the natural soil is clay loam and rock.

This work was done by free labor and under very unfavorable conditions on account of the lack of preparation by the county authorities. The excavation was loosened with picks and plows, hauled in slips, and spread with a grading machine and split-log drag. Rock excavation was made by hand drilling to a depth of 2 or 3 feet and then churned to the required depth. Dynamite and black powder were used in blasting.

The maximum grade of 3 per cent was reduced to 2 per cent. The maximum fill was 3 feet. Two culverts of dry rubble limestone and sandstone, one 2½ by 4 feet, the other 1 foot by 2 feet, and each 12 feet long, with wood floors, were built. These culverts had dry rubble retaining walls and wings. The total amount of rubble was 11.3 cubic yards, and 225 feet b. m. of oak plank was used for flooring. A total of 1,105 cubic yards of earth was excavated.

The road was completed on August 1, 1911. The total length graded was 3,000 feet, the width 16 feet, and the area 5,333 square yards. The same area was surfaced. The average haul was 150 feet and the maximum 300 feet. The actual cost to the community in cash was $127.60; but, figured on the basis of labor at $1.50 per day and teams at $3 per day, the cost of the work would have been $434.25. The cost per square yard was $0.0814 and the rate per mile $760.63.

Doniphan, Mo.—The earth road running northeast from Doniphan toward Poplar Block, called the "Greenville Road," was started on July 13, 1911, and completed on September 2, 1911, with 3 days' delay on account of rain. The equipment consisted of 1 rock plow, 2 turning plows, 6 slip scrapers, 1 wheel scraper, 1 grading machine, 1 split-log drag, and one 3½-ton roller, besides farm wagons and hand tools.

The maximum grade of 20 per cent was reduced to 7 per cent. The natural soil from station 0 to station 4 was clay; from station 4 to station 5, disintegrated chert; from station 5 to station 7+50, loam with clay; from station 7+50 to station 12, chert with clay; from station 12 to station 20, red clay, with a small percentage of sand; from station 20 to station 43, chert gravel; from station 43 to station 49, clay, with a small percentage of sand; from station 49 to station 52, chert; from station 52 to station 85, clay, with a small percentage of sand; from station 85 to station 87, gravel; from station 87 to station 108, clay, with a small percentage of chert; from station 108 to station 119, sand clay; and from station 119 to station 121, chert.

Two 12-inch vitrified pipe culverts, each 20 feet long, and one 18-inch culvert 20 feet long were built. Concrete end walls 6 feet long, 4 feet high, and 9 inches thick were built on two of these culverts, and a concrete bridge was also built with a wooden floor.

The total length graded was 12,100 feet, the width 24 feet, and the area 32,266 square yards. The average haul for excavation was 85 feet and the maximum haul 400 feet. The crown was made 1 inch to the foot and the total earth excavation was 4,437 cubic yards. The end walls contained 1.2 cubic yards of concrete and the bridge 14.2 cubic yards and 1,500 feet b. m. of lumber.

The total cost of the road was $1,192.47; the cost per square yard, $0.037; and the rate per mile, $520.08. Labor cost $1 per day and teams $2 per day. The following material was used on the work: 26 barrels of cement, at $2.25 per barrel, and 1,500 feet b. m. of lumber, at $10 per thousand. The 18-inch vitrified pipe cost $1.75 per foot and the 12-inch pipe cost $0.90 per foot. Miscellaneous items amounted to $21.02, and the balance represents excavation, shaping, surveying, and superintendence.

Brookings, S. Dak.—The work of grading a State road from the Brookings city limit westward toward Volga was begun on September 7, 1911, but was not finished during that season on account of the large percentage of sod contained in the grading material. Provision was made, however, for surfacing early in 1912.

The natural soil is sandy, and plows, slip scrapers, harrows, and a road machine were used in the work. The maximum cut and fill was 2 feet and the maximum grade 0.5 per cent. Three steel reinforced concrete culverts, one 3 by 3 feet and two 4 by 6 feet, containing altogether 1,310 pounds of steel and 55 cubic yards of concrete, were constructed.

The length of the road was 5,360 feet and the width 40 feet, making an area of 23,822 square yards. The crown for 10 feet each side of the center line of the roadway was made ¾ inch to the foot, and the crown of the shoulders, which are 10 feet wide on each side of the 20-foot roadway, was made 3 inches to the foot. The grade of the road was raised about 1½ feet to provide for drainage. The total earth excavation was 4,000 cubic yards. Labor cost $2 per day and teams $4 per day. Culverts were built by contract, at $5.40 per cubic yard; the steel cost $0.033 per pound, and the excavation for culverts, $10.

The total cost of the work was $827.82; the cost per square yard, $0.035, and the rate per mile, $815.59.

Howard, S. Dak.—Work was started on an earth road from Howard westward toward Vilas on May 13, 1912, and completed on July 9, 1912. Four days were lost on account of unfavorable weather. The material in the excavation was loosened with plows and loaded into wagons with shovels or with an elevating grader. Slip scrapers were also used. The material was then spread with a steel drag and road grader, after which it was harrowed. The maximum cut was 1.2 feet and the maximum fill 2.7 feet. The grade was reduced from 4.7 to 3.5 per cent. The natural soil is black prairie loam with clay subsoil and this material was used for surfacing. Slat-bottom wagons were used for hauling for an average distance of 150 feet and a maximum of 500 feet. The total length graded was 15,840 feet; the width in cuts 24 feet and in fills 20 feet; and the area graded was 35,866 square yards. The crown was made ¾ inch to the foot. The earth excavation amounted to 9,135.5 cubic yards. Nine corrugated metal culverts, from 12 inches to 24 inches in diameter, were laid as follows: 26 feet of 12-inch, 102 feet of 15-inch, 78 feet of 18-inch, and 24 feet of 24-inch.

The total cost of the work, including culverts, was $1,463.59; the cost per square yard, $0.0407, and the rate per mile, $487.87. The items of cost were: Excavation, $1,036.27; shaping, $42.80; laying the culverts, $36.07; dragging, $75.83; surveying, $15.60; ditches, $12.25; metal culverts, $244.32, and incidentals, $0.45. Labor cost $2 per day, teams $4.50, and elevating grader $20.

Redfield, S. Dak.—The work at Redfield was begun on October 17, 1911, and completed on October 26, 1911. The principal feature was grading with an elevating grader hauled by a traction engine. Slip scrapers, spike-tooth and disk harrows, and a road grader were also used. Farmers furnished labor free. The natural soil from station 0 to station 5 was sand-clay; from station 5 to station 20, black loam and gumbo; from station 20 to station 46, sand-clay; and from station 46 to station 52+80, black soil and gumbo.

The average haul was 400 feet; the maximum haul, 1,000 feet; the maximum fill, 2.5 feet; and the maximum grade was reduced from 4 per cent to 3 per cent. One corrugated metal culvert 24 feet long was built with cement rubble masonry end walls 5.5 feet by 5 feet by 2 feet 1½ inches thick.

The total length graded was 5,280 feet; the width, 40 feet; and the area, 23,466 square yards. The crown was made three-fourths inch to the foot. The grading amounted to 870 cubic yards of earth and 6 cubic yards of rock excavation.

The cost of the road was $378.31; the cost per square yard, $0.016; and the rate per mile, $378.31. Labor cost $2 per day and double teams $4.50 per day. The principal items of cost were as follows: Shaping, $40.37; culvert, $21.60; grading, $282.01; end walls, $24.08; rock excavation, $6.50; and trimming shoulders and ditches, $3.75. The cost of the traction engine, including coal, water, repairs, etc., was $30 a day.

Rutledge, Tenn.—Surveys were made in May, 1911, for about 19 miles of road in Grainger County from the Knox County line to Tate Springs. The work was done by contract and completed in February, 1912, although very little work was done after December 15, 1911. The maximum cut was 13 feet; the maximum fill, 10 feet; and the maximum grade of 14 per cent was reduced to 5 per cent. The natural soil is of many varieties. Grading was made 30 and 26 feet wide in cuts and 24 feet in fills. The area graded was 322,080 square yards, and the area surfaced with crushed limestone, 3,470 square yards, or 2,600 feet long by 12 feet wide, with a finished roadway of 24 feet. The lower course of stone was 4.5 inches, the middle course 2 inches, and the top course 0.5 inch, making 6.5 inches in the depth of the compacted material. The stone of the lower course varied from 3 to 2 inches; the middle course from 2 inches to 0.75 inch; and the top course from 0.75 inch to dust. The crown was made 0.75 inch to 1 foot. The earth excavation comprised 75,840 cubic yards; the rock excavation, 5,420 cubic yards; and surfacing material, 1,150 cubic yards. The contract price per cubic yard for earth excavation was $0.27½; for rock, $0.87; and for shaping the subgrade, $0.03 per linear foot. A total of 1,050 cubic yards of stone masonry, at $5.50 per yard, cost $5,775; 10 cubic yards of concrete masonry, at $6.50 per yard, cost $65; and 109 cubic yards of reinforced concrete, at $7 per yard, cost $763. Macadam in place cost $1.50 per cubic yard, and 200 barrels of cement cost $1.75 per barrel.

The total cost of the work was $36,887, or about $2,000 per mile for earth construction and $3,500 per mile for macadam construction. Included in the total cost are 4 concrete culverts and 26 bridges with stone masonry abutments, 2 of which have steel spans of 50 feet and 1 of 40 feet.

Brady, Tex.—The first section of a 29-mile road in Brady was started on March 2, 1912, and completed on April 4, 1912. This section begins at station 264 and extends 26,400 feet northward toward Coleman. The grading was made 45 feet wide in cuts and 25 feet wide in fills. The total area graded was 117,300 square yards. The width from ditch to ditch was 45 feet. Plows and scrapers were used for loosening material and 2 road graders, hauled by a 20-horsepower traction engine, were used in surfacing. The crown of the road was made 0.75 inch to the foot. The earth excavation amounted to 13,000 cubic yards and the rock excavation to 1,000 cubic yards. The average haul was 200 feet, the maximum 500 feet, the average cut 1.5 feet, and the maximum grade was reduced from 8 per cent to 5 per cent. Three thousand four hundred and fifty-two feet of this section was rock, and the remainder clay loam with a small percentage of sand or soft limestone. Nine wooden culverts, each 24 feet long, were built of various sizes ranging from 1 foot by 3 feet to 4 feet by 6½ feet.

These culverts contained 9,810 feet b. m. of lumber. Two double metal culverts, each 22 feet long and 2 feet in diameter, were also placed in position. All the wooden culverts have dry rubble wing walls which contain altogether 24.6 cubic yards of masonry. The two corrugated metal culverts have dry rubble masonry end walls 20 feet long, 2 feet wide, and 3 feet high, containing 9 cubic yards of material. Five of the culverts are paved 6 inches deep, making the total amount of paving 12 cubic yards.

The cost of the work was $2,300.76; the cost per square yard, $0.196; and the cost per mile, $460.15. Labor cost $1.65 per day, and teams $3.50 per day. Some of the unit prices were as follows: Earth excavation, $0.09 per cubic yard; rock excavation, $0.50 per cubic yard; end walls and paving, $1 per cubic yard; the traction engine and grader, $18.50 per day; dynamite, $0.1275 per cubic yard of rock; $25 per thousand feet of lumber b. m.; and the preliminary survey, machinery, tools, etc., $4,000, 7⅐ per cent of which, or $285.71, was charged to this work.

EXPERIMENTS AT CHEVY CHASE, MD.[1]

The work at Chevy Chase is the beginning of a series of thoroughly organized experiments in road construction which have been made possible through the appropriation by Congress of a special fund for carrying on such work. The project for the current fiscal year consisted of a series of comparative tests of bituminous binders now on the market, applied according to the specifications of the manufacturers supplying them. The road selected is an extension of Connecticut Avenue, Washington, D. C., and the work thus far completed begins at the District line at Chevy Chase Circle and extends to Bradley Lane, a distance of 3,300 feet. There are eight distinct sections in which various bituminous binders were used, and a section of water-bound macadam upon which experiments in surface treatment are being conducted. A systematic traffic census and accurate costs for maintenance and repairs are now kept.

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[1] See Circular 98, Office of Public Roads, United States Department of Agriculture, for full details of these experiments.

Additional experiments in surface treatment with oil and with molasses-lime mixtures were carried out on Bradley Lane west of Connecticut Avenue.

EXPERIMENTAL WORK ON HILLSIDE AVENUE, NEW YORK CITY.

Experimental bituminous macadam work has been performed under the direction of the office on 2,000 feet of Hillside Avenue, Jamaica, Borough of Queens, New York City. The work comprises 9 experiments—1 of oil-cement concrete, 4 of bituminous concrete, and 4 of bituminous macadam. Samples of stone and bituminous material were tested in the laboratory of this office. The cost of material and labor was carefully recorded and preserved, and a systemmatic traffic census was taken. It is intended to make observations from time to time of the condition of the work and to provide suitable maintenance. An examination in May showed the need of patching in several places. The repairs were promptly made and cost data, a traffic census, and other information were noted at that time and preserved for future reference and comparison.

MEMPHIS-TO-BRISTOL HIGHWAY.

The Memphis-to-Bristol highway commission, eastern division, called upon this office in the fall of 1911 for assistance in advancing the construction of the road projected from Nashville to Bristol, Tenn., and guaranteed the expenses of an engineer under the customary rules of the office. Separate applications were required from each of the counties requesting assistance, and on January 8, 1912, an engineer was assigned to the general supervision of the work, with headquarters at Nashville.

Surveys were organized, in most cases under the county surveyors, and general plans were drawn up for uniform methods and construction for the entire road.

The eastern division of the highway from Nashville to Bristol is 347 miles long. Of this, 183 miles were already macadamized, 19 miles were toll road, 21 miles had been graded, and 143 miles were unimproved. Many of the unimproved sections were little more than trails, and grades entirely prohibitive existed at several places. Much of the unimproved road required entire relocation, in some instances departing several miles from the old road.

The project developed along larger lines than expected by the counties and considerable difficulty was at first experienced in raising and appropriating sufficient funds for adequate construction. This difficulty has never been wholly met and much of the construction as planned is lighter than it should be, but it is expected to improve under the maintenance with the annual funds of the counties concerned.

On June 30, 1912, the project as a whole was advanced as follows: Preliminary surveys, 84.6 per cent; final surveys, 57.3 per cent; and work contracted for, advertised, or under force account, 79.1 per cent. Preliminary surveys have been made of 159.2 miles and final location established for 85.2 miles. Contracts have been advertised or let for 85.5 miles. The maximum grade will be 5 per cent.

Work has been done in eight counties—Cannon, Carter, Cumberland, Loudon, Roane, Warren, Washington, and White. When completed the road will provide a way across the Cumberland Plateau at its most attractive part, having easy grades at all points and in many places magnificent scenery. It will open up a section that is sparsely settled, highly productive, and, until the opening of this road, without any adequate transportation routes. In the other counties the Memphis-to-Bristol highway follows generally the locations of existing roads.

The successful administration of this project under an engineer of this office, acting in a supervisory capacity for all the counties, is an example of effective work that may, under suitable conditions, be developed very largely where counties are unable to join in united action on road matters.

INSPECTION OF OBJECT-LESSON ROADS.

During the year the increasing work of the office reached the point where a more comprehensive system of inspection of field men and methods had to be inaugurated. An engineer of the office was therefore detailed to act as chief inspector. His duties are to inspect and report on the maintenance and present condition of the past work of the office; to make preliminary inspection at places where object-lesson roads are desired and to perfect arrangements regarding labor and equipment, to avoid the loss of time when an engineer goes on the ground to begin actual construction; to represent the chief engineer in the field and to advise with the field men; and to cover miscellaneous advisory and consulting assignments.

During the year interest has been aroused locally throughout west central Kentucky in the reconstruction of the original Louisville and Nashville Pikes, both the Upper and Lower Pikes.

Long sections of both of these famous roads are in almost entire disuse owing to the rough condition of the old telford base. The grading and the base are still intact for miles and two serviceable and substantial highways can be constructed at much less cost than if no grading or foundation existed. The office has made an inspection of both roads with recommendations. The southern end of the Lower Pike, called the Jackson-Davis Way, has been surveyed, and on request of Simpson County a portion of the pike will be reconstructed according to plans and specifications furnished by this office.

Plans are in progress to secure united action among several other counties to have sections of the pike reconstructed as object-lesson roads.

An examination has been made during the year of 24 object-lesson roads for the purpose of determining their present condition, the amount of maintenance received or required, the condition of the culverts, present traffic conditions, the increase of traffic if any, the adaptability of the road to the traffic conditions, and the effect upon future road work. The roads examined are distributed as follows: Two in California, 1 in Florida, 1 in Georgia, 1 in Iowa, 1 in Kentucky, 1 in Michigan, 3 in Montana, 1 in North Carolina, 12 in South Carolina, and 1 in Tennessee. A variety of conditions were found to exist. Some of the roads were in good shape; others showed a decided lack of maintenance; and others in flat country showed that the drainage was insufficient. All showed that a general awakening of interest has followed the construction of object-lesson roads and county bond issues have generally followed. It is noticeable that the sand-clay roads of South Carolina were not found altogether satisfactory at the time of inspection in the winter of 1912. This condition is thought to be due to the unusual climatic conditions immediately following the construction of these roads.

Manteca, Cal.—A bituminous macadam road with asphaltic oil for a binder was built here in September, 1908, and inspected in February, 1912. This road was found in first-class condition, with the exception of one or two holes. It has an extensive traffic of light vehicles and is perfectly adapted to this class of traffic, although no maintenance work has been done. There were no improved roads in the locality previous to the construction of the object-lesson road, but since that time 14 miles of similar roads have been built in the immediate vicinity at a cost of $5,000 per mile.

Stockton, Cal.—A crushed-stone road was built in this vicinity during the summer of 1908 and inspected in February, 1912. The road is in fair condition, except for 1,200 feet, where water has affected the foundation, causing ruts and depressions. The balance of the road does not receive proper maintenance. It has been flooded at three different times, in such a way as to remove the top dressing and oil, which have never been properly replaced. The metal culverts are in good condition. During the greater part of the year the road carries very heavy traffic, consisting of products hauled in narrow-tired wagons. The road does not seem to be fully adapted to the class of traffic, as the foundation is rather weak. The construction of this road has been a large factor in bonding the county for building 238 miles of road and has also shown the road builders some difficulties to avoid in this locality.

Palatka, Fla.—A sand-clay road was built here in April, 1910, and inspected in February, 1912. The present condition of the road is fairly good, although somewhat flat and badly rutted in places. The surface of the road has a tendency to soften under heavy rains, thus showing an excess of clay. A deep ditch has been excavated on one side to provide necessary drainage and the road was well dragged until within a few months ago. Some portions have been resurfaced with material containing too much clay, and $200 has been expended on repairs and maintenance since the original work was done. The road carries ordinary rural traffic and some automobile traffic, but the sand obtainable is of very fine grain and, therefore, the road requires persistent dragging. The indications are that the use of some different material, such as gravel or shell, would be more suitable. Sixty miles of sand-clay road have been built from a $100,000 bond issue, but there is not a single mile in first-class condition at the present time. Failure to maintain is partly responsible.

Talbotton, Ga.—A sand-clay road was built at this point in January, 1912, and was inspected during the same month after being subjected to heavy rains. The road was found to be very muddy and badly rutted. Further work should be done with a better quality of sand.

Ames, Iowa.—A bituminous macadam road was built at Ames in October, 1910, and inspected in November, 1911. The present condition is very good, although there are slight breaks on the south side about 3 feet from the curb, which are thought to have been started during the construction. The road was slightly dusty during the summer, probably owing to material carried from adjoining roads. Nothing has been spent on maintenance. The traffic is light, compared with city traffic. The road is located on the college campus.

Berea, Ky.—A macadam road was built here in December, 1910, and inspected in May, 1912, just previous to applying bituminous material. The road was in good condition, with the exception of a deposit of material from adjoining streets and a depression of the crown caused by settlement over a center underdrain. The travel is very heavy on this road, especially in the late fall and early winter.

Traverse City, Mich.—A macadam road was built here in 1900 and inspected in May, 1912. In 1910 it was partly resurfaced with inferior gravel, but up to that time had received no attention—a good demonstration that the original road had been well built. At the present time, the drainage should be attended to in order to prevent washing by heavy rains. This object-lesson road was undoubtedly the means of starting road building throughout the county.

Billings, Mont.—A gravel road was built at this place in May, 1910, and inspected in June, 1912. It was found to be in fair condition, although somewhat wavy in sections. This is thought to be due to the foundation and to material dragged upon the surface from adjoining roads. This object-lesson road is the only piece of improved road in the vicinity. It has had very little maintenance, and even this has been carelessly performed with a road machine. Practically no benefit has apparently resulted as far as additional work in the county is concerned.

Bozeman, Mont.—An earth road was built in this vicinity previous to 1910 and inspected in June, 1912. It was found to be in poor condition. Only the cross section of the traveled way had been maintained, and it has not been dragged since recent heavy rains, and consequently has badly rutted. The construction of this road, however, led to the building of other crowned surfaces and has been the means of bringing about macadam construction at an early date in the future. A crusher outfit has been purchased and a quarry has been opened.

Missoula, Mont.—An earth road was built here in July, 1910, and inspected in June, 1912. This was the first road in the county to be properly drained and crowned, and it has set the standard for all ordinary construction since that time. It is considered one of the best in the county and has been the means of accomplishing other similar work.

Greenville, N. C.—A sand-clay road was built at Greenville in November, 1908, and inspected in March, 1912. It was found to be very muddy and deeply rutted. The crown of the road is well preserved and the alignment and grade are satisfactory. The road has received no maintenance whatever and at the present time needs a treatment of sand. There is evidence that too much clay was used in the construction, and this is generally true of other sand-clay roads in Pitt County. The pipe culverts are in poor condition—head walls were not built, and the ends of the pipe are broken. Nearly all the culverts are blocked with brush and other débris. They were not built under the direction of this office. The traffic, however, has materially increased. The office supervised the first improved road in the county, and a few miles, modeled after this first section, have since been built. Generally speaking, the sand-clay construction has not been satisfactory.

Walterboro, S. C.—A sand-clay road was built at this point in September, 1910, and inspected in February, 1912. It was found in very good condition, but was slightly muddy. It has been well maintained, but no record of the cost has been kept. The culverts have brick end walls and are in good condition. The traffic has increased, but, nevertheless, the construction is adapted to the conditions. About 20 miles of sand-clay road have been built since the original work was done.

Aiken, S. C.—A sand-clay road was built here in October, 1910, and inspected in February, 1912. This road was built about 1 mile long. The first third of a mile was found to be in excellent shape, but the balance contained a series of mudholes from 6 to 10 inches deep and from 4 to 10 feet wide. Part of the road was under water. It was found that the first third of the mile had been maintained with the drag, but the balance needs extensive repairs. The traffic has increased since the road has been built, but one trouble seems to be that the grade of the road is too low for the flat country through which it passes. Too much clay was used in the construction. A marked general improvement has been made since the road was built.

Allendale, S. C.—A sand-clay road was built in this vicinity in November, 1910, and inspected in February, 1912. The road was found to be in good condition with the exception of a few washouts which have been improperly repaired with sod. The road drag has been used occasionally. The traffic conditions remain the same and the road is well adapted to the amount of travel. It is claimed that there are 185 miles of this class of road in the county, but there are none up to the standard of this object-lesson road.

DARLINGTON, S. C.—A sand-clay road built here in July, 1910, was inspected in February, 1912. It was found to be very muddy and in very poor condition after an unusual winter. It had received practically no dragging. The pipe culverts had also been neglected and the wooden head walls had fallen down. The traffic conditions were unchanged. The road seems to have an excess of clay and should be sanded. There are about 500 miles of improved roads in the county which are partly the result of this object-lesson road.

FLORENCE, S. C.—A section of gravel road 170 feet long and another of sand clay 830 feet long were built at this point in November, 1909, and inspected February, 1912. The original road has been dug up by the building of sewers, and it is now becoming a residential street, requiring a more permanent kind of pavement. Preparations are being made for bitulithic construction. It was reported that during the existence of the original road suitable maintenance was provided. This road was the first in the county to be improved, and similar methods have been extended throughout the county.

HARTSVILLE, S. C.—A sand-clay road was built at Hartsville in June, 1910, and inspected in February, 1912. It was found to be very muddy, partly due to a severe winter, but it had been dragged only twice since construction. Culverts were partially filled with mud, and the settlement of the work around the culverts shows the lack of proper attention. The amount of traffic was unchanged since the time of construction. The road seems to be satisfactory under ordinary conditions, and there has been a general gain in road work throughout the county, although no apparent effect can be traced to the object-lesson road.

KINGSTREE, S. C.—Two sections of sand-clay road were built at this point in April, 1911, and inspected in February, 1912. Both sections are soft on the top, but are in better condition where dragging has been maintained, and in general they have been carefully dragged. The traffic conditions remain practically the same, although the farmers are now going out of their way to use the improved road. Unusual weather conditions have existed throughout the county and this seems to be the reason why all the roads are in poor condition, rather than because of the materials or methods of construction used. About 50 miles of sand-clay road have been built since the object-lesson road was constructed, and a general interest has been aroused for better methods.

MARION, S. C.—A sand-clay road was built at Marion in June, 1910, and inspected in February, 1912. The material used was of inferior quality. The road has not been properly maintained by dragging, but could be made the best road in the county by this method. The culvert outlet ditches were partially filled with mud. The traffic has trebled, but the surface is adapted to the traffic if the road is properly maintained. This road was the first improved road built in the county and has stimulated the interest in roads.

NEWBERRY, S. C.—A sand-clay road was built in June, 1909, and inspected in February, 1912. The sand has been washed from the surface and the road is very muddy. Several depressions have formed, particularly over the pipe culverts. The road received very little attention except from the use of the drag. The culverts are in first-class condition since they have been protected by masonry end walls. No change has been noticed in the amount of traffic, and the construction method adopted is suitable to the conditions, although at the present time further maintenance is absolutely necessary. The result of the work has been to stimulate the building of split-log drags.

SUMPTER, S. C.—A sand-clay road was built here in September, 1908, and inspected in May, 1910, and in February, 1912. At that time the surface was very muddy. This is thought to be partly due to insufficient drainage, but the road has not been maintained at all, while the traffic has increased materially. The adjoining country is very flat, and drainage is impracticable except by raising the grade of the road. Since its construction 75 miles of road were built in 1909, 85 miles in 1910, and 105 miles in 1911.

WINNSBORO, S. C.—A sand-clay road was built in this vicinity in August, 1909, and inspected in February, 1912. The original road was built of inferior materials. The inspection was made during a rainy season, and the road was found to be covered with about 1 inch of mud. There has been absolutely no maintenance, but it is reported to be in good condition during dry weather and would be adapted to the traffic conditions if properly maintained. Fairfield

County is replacing its plank culverts with concrete. Since the road was built about 50 miles have been constructed under engineering supervision. A board of business men has taken great interest in the work.

Winchester, Tenn.—A macadam road was built at this place in December, 1909, and inspected in October, 1911. It was found to be in very good condition, excepting on the summits of hills, where the fine material had blown away, leaving the traveled part of the road bare. An attempt has been made to maintain these places by supplying stone dust. The culverts and bridges were found in good condition. An increase of automobile travel has resulted from the construction of this road. No further road work has been attempted, and this is thought to be traceable to the high cost of building.

UNFINISHED WORK.

Work begun on object-lesson roads at Fort Myers, Fla., in May, 1912, and at Jonesville, Va., in April, 1912, was still in progress at the end of the fiscal year. These roads will be described in the annual report for 1913.

HIGHWAY BRIDGES AND CULVERTS.

During the past fiscal year much time has been devoted to collecting and preparing useful data relating to the design and construction of highway bridges and culverts. A bulletin containing a number of tables and many typical designs has been prepared and will soon be ready for publication.

Only three separate bridge and culvert projects were undertaken during the year. Many culverts were constructed in connection with object-lesson roads, however, and a number of designs were furnished for the guidance of local engineers. Replying to inquiries and furnishing advice by letter also constituted a large part of the work. A description of the object-lesson projects follows:

Goldsboro, N. C.—Two abutments of Portland cement concrete for an 80-foot span steel bridge over Little River were constructed on the Central Highway in Wayne County at the State hospital. Work began on March 5, 1912, but was discontinued on March 15 on account of continued high water. On April 23 the work was resumed, and the project was completed on June 10, 1912. The foundations are gravel on the east side of the river and sand on the west side. The excavation was made by hand, and the material was removed with wheelbarrows and carts. Water was kept out of the cofferdams by means of a 1¼-inch diaphragm pump. The aggregate for concrete consisted of gravel from ¼ inch to 1¼ inches in diameter and fairly good sand. The materials were mixed in the proportion of 1 part Portland cement, 2 parts sand, and 3½ parts gravel. Gravel was obtained from a pit and hauled 1½ miles.

The haul for sand was one-half mile. The following quantities were handled: Two hundred and fifty cubic yards of earth excavation, 168.5 cubic yards of concrete, 147 cubic yards of gravel, 73 cubic yards of sand, and 261¾ barrels of cement.

The total cost of the abutments was $964.53. The principal items of cost were excavation, 250 cubic yards, at $0.208 a yard, $51.96; hauling gravel, 147 cubic yards, at $0.39 a yard, $57.50; hauling sand, 73 cubic yards, at $0.14 a yard, $10.20; cofferdam piling, $22.84; pumping, $53.76; screening gravel, 147 cubic yards, at $0.49 a yard, $73; forms, $47.54; mixing and placing concrete, $149.58; cement, 261¾ barrels, at $1.44 a barrel, $376.92; lumber, $113.68; nails, $4.55; and wire, $3. The laborers employed were patients from the hospital, and the cost per patient was figured at $0.40 per 10-hour day. The cost of foremen was $1 per day and of carpenters $1.50 per day.

Dillon, S. C.—A 10-foot span concrete culvert, with reinforced slab superstructure, was built at Dillon, S. C. Work began on September 7, 1911, but several days were consumed in building a temporary road, and concrete construction was not begun until September 9. The last concrete was deposited on October 5, and the project was entirely finished on October 20.

The culvert is in Maple Swamp, on the road from Dillon to Bethea's farm, and the adjacent land is approximately level. The foundation, which is natural soil, was excavated by hand, and the material was removed with wheelbarrows. Sand was obtained from a pit and hauled 3 miles, while crushed syenite was shipped 112 miles by rail and hauled 1 mile in wagons. For the abutments the concrete was mixed in the proportion 1 : 2.5 : 5, and for the floor slab and parapets 1 : 2 : 4. The total amount of concrete in the structure is 32 cubic yards. The following were the principal items of cost: Temporary road, $4.10; excavation for abutments, $14.68; excavation for outlet, $3.50; mixing and placing concrete, $16.23; hauling sand, $21.37; hauling stone from cars, $15.25; lumber for forms, $23.65; building forms, $14; taking down forms, $2.95; 58 ¾-inch square-twisted steel bars, each 12 feet long, $19.66; 37 barrels of cement, at $1.96 a barrel f. o. b. Dillon, $72.52; 37½ tons of broken stone, at $1.88 a ton f. o. b. Dillon, $70.50; hardware and sundries, $8.63; rebate on cement bags returned, $0.24 per barrel, $8.82.

The total cost of the work was $278.22, or $8.693 per cubic yard of concrete. The costs per cubic yard of concrete for each of the several principal items were as follows: Forms, $1.27; excavation, including that for outlet, $0.568; mixing and placing concrete, $0.507; hauling sand from pit, $0.668; hauling stone from cars, $0.476; steel bars, $0.614; cement f. o. b. Dillon, with rebate, $1.99; stone f. o. b. Dillon, $2.23; hardware and sundries, $0.27. The cost per hour for convict labor was figured at $0.025; for guards, $0.20; for teams without drivers, $0.10; for teams with drivers, $0.30; and for carpenters, $0.30.

A 16-foot span reinforced concrete culvert of the encased I-beam type was also constructed at Dillon, S. C. The work of excavating the foundation was begun on September 22, 1911, the first concrete laid on September 24, the concrete work finished on October 4, and the project entirely completed on October 17, 1911. This culvert is located on the Latta Road, which extends south from Dillon toward Latta, and the adjacent land is approximately level. The foundation was prepared by embedding a grillage of logs, spaced 2 feet, center to center, well below the ground water line. The excavated material was handled with shovels and removed in wheelbarrows. Sand, cement, and stone were hauled in flat-bottom wagons of approximately one-half cubic yard capacity. The aggregate consisted of crushed syenite and sand. The sand was hauled 3 miles in wagons from a local pit and the stone was shipped 112 miles by rail and hauled 1 mile in wagons. The structure contains 54 cubic yards of concrete, all of which was mixed in the proportion 1 part Portland cement, 2 parts sand, and 4 parts broken stone.

The total cost was $534; the cost per cubic yard was therefore $9.89. The following are the principal items of cost: Excavation, $17.40; grillage foundation, $9.38; pumping, $3.75; mixing and placing concrete, $21.75; hauling sand, $24.60; hauling stone from car, $22.60; miscellaneous, hauling cement, etc., $6.87; building forms, $11.25; removing forms, $10.50; lumber for forms, $36; 62 tons of stone, at $1.88 per ton, $116.56; 73¼ barrels of cement, at $1.96 per barrel, $143.57; nine 12-inch 31½-pound steel I-beams, each 20 feet long, $110.85; and 35 ½-inch square-twisted steel rods, $16.50. The rebate on cement bags returned amounted to $17.58. The costs per cubic yard of concrete for the several principal items were as follows: Excavation, $0.32; mixing and placing, $0.403; forms, including cost of lumber, $1.07; hauling sand, $0.455; hauling stone, $0.419; stone f. o. b. Dillon, $2.15; cement f. o. b. Dillon, with rebate deducted, $2.33. The cost per hour for convict labor was figured at $0.025; for guards, $0.20; and for teams with drivers, $0.30. The cost of superintendence was not included.

MODEL COUNTY ROAD SYSTEMS.

Lonoke County, Ark.—At the request of Mr. R. B. Eggleston, deputy county surveyor, an engineer from this office visited Lonoke County in February, 1912, and, after studying local conditions, made specific recommendations. It was pointed out that considerable improvement could be obtained in the treatment of the "buck-shot" soil by decreasing the width and raising the grade of the roadbeds above the surrounding country and arranging better drainage. Detailed specifications were supplied for the treatment of the "buck-shot" subsoil—with earth to produce an earth road which could be maintained by dragging, with sand to produce a sand-clay road that would have a surface superior to the earth road, with burnt clay at a considerable advance in cost, and with ordinary macadam surfacing. It was suggested that in view of the fact that many miles of road still remained to be built in the county, experiments be made, with each of the various classes of surfacing recommended, on the road from England to district No. 4 in Pulaski County. Special emphasis was laid in the engineer's report concerning maintenance and the use of the road drag.

WALTON COUNTY, FLA.—Work in this county during October, 1911, was for the purpose of investigating conditions in connection with the use of a bond issue for $70,000 for the particular road district which contains the county seat, De Funiak Springs.

The proposed system involves approximately 60 miles of road, 34 miles of which is the central county road, and the remaining 25 miles are lateral roads extending north and south from the principal railroad points to the district line.

A study was made of existing conditions and road materials. Clay and sand deposits were located, and also some fine gravel. The road location and the right-of-way width were determined by law. Recommendations covering clearing of the right of way, grading the width of traveled way, and other details were supplied. Specific information for surfacing with sand-clay was submitted, together with specifications for culverts, etc.

PULASKI COUNTY, GA.—An engineer from this office made an investigation in Pulaski County during May, 1912. This county covers an approximate area of 463 square miles and has about 373 miles of public roads. About 113 miles of this system sustain the largest amount of the traffic. The soil is generally sand or clay, or a mixture of both. There are limited deposits of gravel. Conditions are favorable for the construction of sand-clay roads, as the materials will not be hauled for more than a mile, and frequently are to be found along the road. There is stone suitable for concrete use in nearly every creek. The present condition of the roads was studied, particularly with reference to drainage and grades.

The county's finances were investigated and a table prepared showing the distribution of property and road mileage. A study was made of the present road law and recommendations were submitted for its improvement. A general system for improving the roads of the county was developed and detailed information was supplied for the three natural subdivisions of the county. The estimated cost of constructing eight sections, aggregating approximately 35 miles, was supplied, together with specifications and detailed plans for earth and sand-clay surfacing, culverts, end walls, etc.

The report submitted gave special attention to the financing and management of future maintenance operations under the improved road system.

ST. JOSEPH COUNTY, IND.—During the interval from May 27 to June 15, 1912, an inspection of about 300 miles of road leading in various directions from South Bend was made by an engineer from this office. The general condition of the roads was observed and the location of gravel deposits and other road materials investigated. As a result of the study it was recommended that the less important roads be built with gravel and that concrete be used for those of more importance. An excellent quality of sand and gravel is present for use in concrete work.

The roads under consideration for improvement were the Goppart Road, consisting of six separate sections leading from the town of Walkerton, a total of 78,862 feet; the Whittmer Road, near South Bend, 15,000 feet; the Markham Road, near South Bend, 15,800 feet; and the Leach Road, also near South Bend, 15,800 feet. Specifications for the construction of the first two of the above roads were supplied. It was proposed to build the last-mentioned roads of crushed bowlders, but specifications were prepared for constructing them with concrete.

Estimates and recommendations were developed with the cooperation of the county engineer. It is expected that other roads will be considered for construction in the future.

NOXUBEE COUNTY, MISS.—*Supervisor's district No. 1.*—During March, 1912, an investigation for the construction of two permanent highways was made by an engineer from this office. These roads require financing by bond issue, and may be regarded as the beginning of systematic road improvement in this district. A report was made by the engineer showing the existing conditions of soil and topography, the location of road materials and their value, and the availability of material outside the district.

Detailed estimates of cost covering four sections of road, aggregating 18 miles, were made. The estimated cost of the roads was $75,162, which is an average cost of $4,176 per mile for a 9-foot macadamized width. For a 15-foot width the estimate shows a cost of $6,044 per mile.

After a general inspection of the roads, bridges, culverts, and materials within the county, the representative of this office was able to make general recommendations concerning the road situation, and particularly the maintenance of earth roads, both in regard to method (especially drainage) and management.

Scott County, Miss.—*Supervisor's district No. 1.*—This district is about 6 miles wide and 24 miles long, and contains Forest, the county seat. During June, 1912, an engineer from this office made an investigation of certain roads in this district with a view to advising the expenditure of the proceeds of a $75,000 bond issue. The bonds issued in this district are to bear 6 per cent interest, and are to be redeemed in amounts ranging from $4,000 to $5,000, beginning on July 1, 1922, and finishing on July 1, 1937.

The work of the engineer for this office consisted essentially in conferring with the local engineer in charge of the proposed road improvement and making suggestions as to the selection and use of available materials and the determination of their fitness by constructing experimental sections. The engineer was furnished with specifications and information dealing with contracts.

A noticeable provision in the law under which this county operates is a 1-mill tax for maintenance, and a commutation tax of $3 or 10 days' work, which is also available for maintenance.

Arrangements were made to continue supplementary advice and recommendations to this district when requested.

Craven County, N. C.—During July, 1911, an engineer from this office made an inspection of road conditions in this county with particular reference to the building of the Central Highway. Specific recommendations regarding the location and changes in it were supplied. Special attention was given to the location of the road at Pine Grove in relation to the Norfolk Southern Railroad and to the bridge required near Havelock and the necessary grading of approaches. Work in this county was done in cooperation with the county engineer and no formal specifications or details were supplied. The importance of proper maintenance was pointed out and the improvement of the road machinery was recommended. Throughout nearly the entire length of the Central Highway in this county sand-clay construction is possible and economical.

Duplin County, N. C.—*Warsaw Township.*—During September and October, 1911, an engineer from this office made a study of the road conditions in this township. A preliminary estimate was made for sand-clay and top-soil surfaced roads. A map was prepared showing the proposed location of 14 roads, aggregating 46½ miles approximately. The estimate for improving these roads totaled $29,155.

Jones County, N. C.—Special attention was given to the Central Highway in this county during July, 1911, and a preliminary location for this road throughout the entire county was completed. Recommendations for surfacing materials and the construction of culverts and bridges were made. The improvement of the Central Highway will involve a number of relocations and considerable ratification of grade, all of which was covered in the report by the engineer from this office. In connection with this work recommendations were submitted to the county authorities for improving the road-building equipment with new machinery and tools, and for the employment of an engineer. Suggestions were made as to the future development of proper alignment with adequate width of right of way and of better drainage, and details for the construction of sand-clay roads were supplied. Special emphasis was placed upon the proper maintenance of the roads by the use of the split-log drag.

Lenoir County, N. C.—Work in this county involved a study of the location for two sections of the Central Highway. On both sections sand-clay construction for the surface is available and economical. Detailed information was developed showing all the necessary changes in the grade and alignment for the entire road. Recommendations for new culverts and bridges were made.

In some portions of the road suitable gray top soil is available and its location was indicated. General recommendations for the purchase of road-building equipment were submitted, together with suggestions for improved maintenance by the patrol system and the use of the road drag. It was recommended that an engineer be employed, and details were supplied for the information of the authorities concerning the width of road and proper methods of shaping and constructing sand-clay surfaces.

MARLBORO COUNTY, S. C.—During October and November, 1911, an investigation was made for the development of a system of improved roads in Marlboro County. Materials available in this county are clay, sand-clay, and gravel (both with sand and with clay matrix). Materials are well distributed and in past construction have given good satisfaction. A map was prepared showing the proposed roads and the corresponding deposits of materials.

Approximately 142¾ miles of road were inspected, and estimates for the improvement of this mileage in 67 different sections were prepared. The total estimate was $128,000, which is about $900 per mile, including the necessary drainage structures. The total length of roads in the county is about 350 miles, and the present plans of the county are to raise money by a bond issue to the amount of $300,000. Recommendations as to the management of the proposed improvement were submitted.

MCMINN COUNTY, TENN.—An engineer from this office was assigned in November, 1911, upon the application of the county authorities, to consider the local situation in connection with a bond issue for improved roads. Bonds to the amount of $325,000 became available during September. The act authorizing the bond issue practically determined the location of the proposed roads. The work of the engineer from this office consisted in supplying information during the progress of the work, which had already begun on his arrival. Grading was finished for about 40 miles of road and surveys were well advanced under the engineer employed by the county. Convict labor was available for a considerable part of the work done under this bond issue.

SUMNER COUNTY, TENN.—This office sent an engineer in April, 1912, to advise with the county officials of Sumner County, Tenn., and make certain surveys of proposed roads. A bond issue of $200,000 had been provided and subdivided into two funds—$100,000 to be spent in the purchase of toll roads and their improvement in the southern part of the county and $100,000 for new roads in the northern portion of the county, amounting to about 70 miles. Three preliminary studies were made for locating new roads, and, after advising with the pike committee, a survey was made for a road east to west across the county by way of Portland and Westmoreland, and a road, north to south, running from the south of the ridge and connecting with the proposed east-to-west road. Estimates of eight sections of road aggregating 33.44 miles were made, and the order of the improvement recommended. The aggregate cost of these improved roads was estimated at $145,122.87. Detailed estimates of three of the above roads were developed and the construction of the other four was recommended to be deferred.

The roads in this estimate involve macadam, gravel, and sand-clay construction. Bridges and culverts were figured for concrete or steel construction of the most permanent character. The estimates for the construction of the entire system of roads were developed with reference to local conditions and existing materials.

The engineer's report covers details as to the methods of carrying out the work, labor, contracts, width of roads, use of materials, and future maintenance. Detailed specifications for macadam, gravel, and sand-clay work were supplied.

ELLIS COUNTY, TEX.—*Garrett-Ennis district.*—In May, 1912, an engineer from this office made a study of the road situation in Garrett-Ennis district. He studied the work already in progress under a bond issue, of which $250,000 was still available. Specific recommendations were made concerning the employment of a county highway engineer, the wages of superintendents and foremen, the purchase of improved gravel pits, the use of a harrow and road drag, and the management of the laboring force. Details of relocation, cross sections, methods of surfacing, and improvement of concrete specifications and bridge construction were also submitted.

MCCULLOCH COUNTY, TEX.—*District No. 1.*—A bond issue of $75,000 became available in this county and construction began on February 7, 1912. An engineer from this office had been assigned to prepare surveys and estimates for about 70 miles of road to be improved. Subsequently the commissioners' court employed an engineer, and the work was begun along the lines originally recommended. On April 6 a second engineer from this office was assigned to study conditions in this district. He checked up the previous estimates and made recommendations covering details of the work on six roads.

It was originally planned to construct 69 miles of road, but as the funds were not sufficient for surfacing the entire mileage the grading and alignment of the entire system were undertaken, with the idea of surfacing as much as possible with the remaining funds. The second engineer from this office acted as inspector for a time for the whole improvement work, and later confined his services to acting as superintendent of construction on the Coleman Road, which was constructed in finished form.

ROBERTSON COUNTY, TEX.—*Precinct No. 1.*—During April, 1912, a study was made of the improvement of nine different roads in this precinct, aggregating 54½ miles. An engineer from this office prepared preliminary estimates of the cost of the improvement of 15 miles west of Calvert with imported surfacing material, amounting to $85,440. An estimate for grading and surfacing with sand-clay and gravel on 39½ miles east of the town amounted to $95,100. The total estimate was, therefore, $180,540. The roads called the Barton, Wild Cat, and Black Ridge roads, west of Calvert, were estimated for gravel surfacing with imported material, as there is no local material, and the location is on the Brazos River bottoms. Considerable grading was recommended on the roads east of Calvert, but sand-clay and some gravel are present along the layout.

WICHITA COUNTY, TEX.—*Precinct No. 1.*—During December, 1911, an investigation of road conditions near Wichita Falls was made by an engineer from this office with a view to the development of a model system. A bond issue of $150,000 was available for road work. It was found that approximately 60 miles of road should properly be improved to provide for the main lines of travel in the precinct. Estimates were prepared covering the construction of 33¾ miles. This mileage consists of 3½ miles of bituminous macadam road 15 feet wide, 19¾ miles of water-bound macadam 12 and 15 feet wide, and 10½ miles of gravel road 12 feet wide. Before selecting the roads to be improved a careful study of the entire system and an examination of the existing road materials in the precinct were made. In some places suitable gravel is available, notably north of Wichita Falls. Recommendations for handling this gravel to remove an excess of clay were submitted. Unit prices for labor and materials were ascertained and detailed estimates covering 17 sections were prepared. The entire cost of construction, including engineering supervision, hiring of roller, etc., was estimated at $149,000.

The problem of constructing macadam roads south of the town of Wichita Falls involved importing broken stone and special care was given to the selection and cost of such material. Detailed specifications for various classes of construction were supplied.

BENNINGTON COUNTY, VT.—During the spring of 1912, at the request of 69 of the 74 road officials of Bennington County, Vt., and with the approval of the State highway commissioner, C. W. Gates, an engineer from this office was detailed for a period of one year for service in this county. The work of the engineer consists in cooperation with the local officials for the purpose of investigating the best methods of management, construction, and maintenance of the highways in that county. The service of the engineer commenced May 1, and his efforts have been directed so far to the selection of road-making materials, the preparation of surveys in 17 towns, and suggestions and advice on particular phases of road matters arising from time to time. Plans have been made for two stone masonry bridges, and plans and profiles have been made for various sections of road in difficult locations.

At the close of the fiscal year construction was in progress in 12 of the 17 towns along lines indicated by the engineer from this office. There is a total of approximately 750 miles of public roads in Bennington County, and particular attention has been directed to the establishment of a good maintenance system. A considerable reduction in the cost of maintenance has already been secured, and the use of the split-log drag has been largely adopted in the various towns. An interesting feature of the work in this county is the fact that private citizens have donated road material, land for rights of way, and money to assist in the work of road improvement. It is expected, in connection with the work of construction and maintenance, to make a thorough economic study of road matters and to determine the actual service of roads and the amount justified, on a strict economic basis, for their future improvement and maintenance.

Fauquier County, Va.—At the request of Mr. J. Donald Richards, of the road board, a study of proposed road improvement in the vicinity of Warrenton was made during October, 1911. Four roads were studied—the Alexandria Pike, 7 miles; the Spring Road, 8 miles; the Waterloo Road, 7 miles; and the Bethel Road, 2½ miles. The questions involved concerning the improvement of the main roads were investigated and recommendations were submitted. The roads are subjected to considerable traffic, but it was recommended that a portion of them be constructed of water-bound macadam, and that the Alexandria Pike, which is likely to become the main artery from Virginia to Washington, be built with bituminous construction.

Prince William County, Va.—*Gainesville district.*—During September, 1911, an investigation of the road situation in the Gainesville district was made by an engineer from this office. His report covers existing roads and materials available for construction. Recommendations were submitted concerning the details of width and depth of wearing surface for rebuilding various roads to develop an improved system. An approximate estimate for the cost of 23 miles in 10 sections was made. The order of construction for this system of roads was carefully indicated and a bond issue of $100,000 was recommended for their construction.

Wise County, Va.—During April, 1912, at the request of the authorities of Wise County, an engineer from this office made a study of the development of an improved road system which is in progress under an issue of bonds amounting to $700,000. The topography of this county is extremely rough and irregular. The natural slopes, in some places for 2 and 3 consecutive miles, are as steep as 1¼ to 1, and are held up by outcrops of ledge.

The construction of improved roads here requires considerable new location and expensive grading. Interesting engineering features have developed in the selection of locations and they were studied for the information of this office. A map was prepared showing the 11 sections of road under construction, aggregating 125.3 miles. The entire mileage will not be macadamized, but some 50 miles of road have now been finished with macadam surfacing, and the entire system will be graded by the end of the present year. The report of the engineer laid especial emphasis upon the need of proper maintenance and systematic management of the new roads.

Harrison County, W. Va.—During March, 1912, an inspection of the principal roads of Harrison County and an examination of the available road materials were made for the purpose of recommending a system of roads that will serve the county best and will not cost more than $1,000,000. A bond issue for this amount was proposed. A study of the finances and the present method of road administration was made. As a result of this investigation a report was made recommending that bonds to the amount of $1,000,000 be issued, one-fortieth of which should be retired each year; that about 55 miles of the main roads of the county be paved with brick for a width of 14 feet; that the present system of road administration be changed so that the present funds may be more economically and advantageously spent; and that the present system of deporting violators of the law be abolished and the jail convicts put to work upon the roads.

Marshall County, W. Va.—During September, 1911, an engineer from this office visited Washington and Union Townships to inspect the road conditions and prepare recommendations for future use. A report was made dealing with the road materials in the various districts, such as shale-clay, sandstone, and limestone. The question of brick manufacture was considered with reference to paving certain roads with brick. There were about 100 miles of trunk roads to be constructed in this county, and it was recommended that a suitable engineer be employed and that careful estimates be prepared for determining the proper material in future work. It was recommended that particular attention be given to the relative cost of hauling road material and the cost of locally manufactured brick. Attention was given to the plotting of the roads, changes in grading and alignment, preparation of cross sections, and location of drains, culverts, bridges, etc. No detailed specifications were prepared, but it was urged that an engineer employed by the county should immediately take up a systematic study of details.

TAYLOR COUNTY, W. VA.—During May, 1912, at the request of the county authorities, a highway engineer from this office made a study of conditions in this county relative to a proposed bond issue of $400,000 for improved roads. A system of radial highways from the town of Grafton was projected. The proposed system involves a total of 32 miles of new work, of which 18 miles is of brick. Recommendations were submitted for 12 miles of brick road 14 feet wide and 6 miles of single track brick road 9 feet wide. Fourteen miles of the system were planned as macadam road. The work in this county also included a thorough study of local soils, sources of road material, investigations of the use of convict labor, and general suggestions as to the proper method of carrying out the proposed improvement. The present system of road management and revenues was investigated and recommendations were made concerning them.

INVESTIGATIONS OF ROAD MATERIALS.

During the fiscal year 1912 there were received 669 samples of road materials to be tested in the physical and chemical laboratories. These samples included road-building rocks and gravels, sand, clay, marl, cement, concrete, iron-ore tailings, soil, shells, slag, oils, tars, etc.

PHYSICAL TESTS.

The work of the testing laboratories, as in the past, has included research investigations, as well as the routine testing of road materials.

The road-building rocks tested included 115 samples of limestone, 71 of gravel, 41 of sandstone, 39 of dolomite, 32 of granite, 29 of trap, and 144 miscellaneous samples, including gneiss, schist, shale, slate, etc. These samples were received from 37 States and Territories, as well as from Canada, Porto Rico, and Wales. The States sending the greatest number of samples were: Virginia, 55; Pennsylvania, 46; Texas, 25; Ohio, 24; North Carolina, 21; Maryland, 20; and New York, 18.

Research work on concrete included the testing of a large number of full-sized arch culvert sections, to obtain data of value in their design. Strains were measured, enabling the overstressed portions to be determined, and finally the maximum or breaking load for each section of arch was obtained. The study of the expansion and contraction of concrete has progressed and has created much interest among concrete workers. This experiment will be continued, both in the laboratory and in the field. The field measurements will embrace the investigation of a concrete roadway made with different kinds of aggregate. For fine measurement in concrete investigations a new instrument has been designed and built in the office. Other investigations were started to determine the effect of concentrated loads on reinforced concrete slabs. This is a problem of importance in the design of bridges by this office.

The work in oil-mixed concrete is being continued for the most part in making long-time strength tests on samples of this material.[1] Several papers, technical in nature, concerning results obtained in the research work of the testing laboratories, were presented before engineering societies at Washington, New York, Cleveland, and Indianapolis. The subjects included oil-mixed Portland cement concrete, the expansion and contraction of concrete, and the physical testing of rock for railroad ballast.

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[1] For complete information see Bulletin 46, Office of Public Roads, United States Department of Agriculture.

The instruction of the student engineers and assistant highway engineers in the testing of road materials has been carried on as in past years.

CHEMICAL INVESTIGATIONS.

During the past fiscal year 198 samples were received in the chemical laboratories for examination.

In addition to the routine work of the laboratory several lines of research were undertaken. This work was mainly for the standardization of methods, and includes an investigation into the effect of the diameter of the bitumen holder on the penetration test, and an improvement or modification of the dimethyl sulphate test for tar-asphalt and tar-petroleum mixtures. The results of these investigations were prepared for presentation before the International Association for Testing Materials and the Eighth International Congress of Applied Chemistry, respectively. The improvement of the existing methods of testing or the proposal of new and more accurate ones is an important function of the laboratory organization, and researches upon the melting point and distillation methods are now in progress. Part of the work has been carried along in conjunction with a special committee of the American Society for Testing Materials, and it is expected that some final recommendation will be made at an early date. The study of the effect of exposure on various types of bituminous materials is producing results of considerable interest, and some of the data thus far accumulated will shortly be published.

During the year a paper entitled "Organic residues from soluble bitumen determinations" was presented before the American Society for Testing Materials, and an address on "The use of bituminous binders in road construction and maintenance" was made before the Virginia Road Builders' Association.

The preparation of specifications for bituminous road materials and methods of construction has been continued, and during the fiscal year 79 specifications were issued, of which 40 were for oil-asphalts and other petroleum products, 26 for refined tars, 5 for fluxed native asphalts, 5 for bituminous construction, and 3 for surface treatments.

Cooperation of the chemical laboratory and engineering force continues to demonstrate its value, and during the year 7 engineer students and 2 highway engineers were given a course of laboratory instruction. The laboratory force participated in field work on 33 assignments distributed throughout the United States.

The work of the petrographic laboratory was essentially a continuation of that of last year.

Quantitative analyses of 85 rock samples were made, while 38 samples were analyzed qualitatively, and 301 samples were examined chemically and mineralogically for the purpose of identification and classification. Besides the routine work, the study of blast-furnace and open-hearth slag and Portland cement clinkers was continued to determine the best means of utilizing these products for road-making purposes.

During the year a course of instruction in the identification of minerals and rocks for road making was given to six civil-engineer students.

INSTRUCTION IN HIGHWAY ENGINEERING.

The office has continued during the year to appoint graduates in civil engineering from the leading engineering institutions of the country to the position of civil engineer student. In order to obtain eligibles the United States Civil Service Commission on March 13 and 14, 1912, held an examination in various parts of the country. From the register thus established 10 appointments were made and during the year there were 4 resignations. Other resignations from the staff of the office were as follows: 2 highway engineers, 1 bridge engineer, and 1 chemist.

During the first year that engineer students are connected with the office they are given a thorough training in all branches of highway work, both in the field and in the laboratories, while at the same time their services are fully utilized by the office. At the end of the first year, if the students prove worthy and it is found that the needs of the service justify it, they are promoted to the position of junior highway engineer. At the close of the second year they are eligible for further promotion to the grade of highway engineer, and ultimately to the position of senior highway engineer.

This project has given excellent results, and the engineers after a few years' training in the office are in demand for State and county work. The practice of permitting engineers to resign is detrimental to the service, as the office is constantly losing some of its best men, but the benefits derived by the various States and counties through the distribution of trained men to all sections of the country are sufficient to vindicate the wisdom of such a policy.

LECTURES, ADDRESSES, AND PAPERS.

During the year 1,139 lectures and addresses were delivered in various parts of the United States by 27 representatives of the office. In 1910, 523 lectures were delivered and 723 in 1911. The total attendance this year was 208,472, while in 1911 it was 200,000. Lectures are included which were delivered in connection with road-improvement and agricultural trains. The total attendance at the lectures given in connection with the road-improvement trains during the year amounted to 99,259, exclusive of those delivered on the St. Louis & San Francisco Railroad.

All of the lectures were of a practical or scientific character and most of them were illustrated with lantern slides. Besides the lectures given in connection with road-improvement trains addresses were given at farmers' meetings and road conventions. Several papers were also read at colleges and universities and before scientific organizations and societies. Short lecture courses of highway engineering were presented at the University of Idaho and at the University of Kentucky.

The names of the States and the number of lectures given in each are as follows: Alabama, 29; Arkansas, 14; Colorado, 4; Delaware, 5; District of Columbia, 2; Florida, 50; Georgia, 82; Idaho, 4; Illi-

nois, 5; Indiana, 2; Iowa, 1; Kentucky, 13; Louisiana, 10; Maine, 6; Maryland, 13; Michigan, 38; Massachusetts, 4; Mississippi, 42; Missouri, 46; Nebraska, 1; New Jersey, 3; New York, 3; North Carolina, 142; North Dakota, 22; Ohio, 25; Oklahoma, 63; Pennsylvania, 12; South Carolina, 90; South Dakota, 3; Tennessee, 88; Texas, 164; Utah, 3; Vermont, 20; Virginia, 99; West Virginia, 22; Wisconsin, 5; and Wyoming, 4.

That this method of presenting information produces good results is shown by the fact that the applications have been entirely voluntary and that the office does not send lecturers to any community except upon request, and not then until it is assured that the meeting has been properly advertised and that the attendance will justify the expense. During the year it was necessary to refuse 85 applications for lectures.

SPECIAL INSPECTION AND ADVICE.

Upon the request of officials and others having jurisdiction over roads to be improved, engineers have been assigned to advise with local officials on the various phases of road work. Under this arrangement 24 States and the District of Columbia have derived the benefit of consultation with engineers, experts, and chemists of the office. Such assignments have been made as follows among the several States: Arkansas, 1; Colorado, 1; Connecticut, 15; District of Columbia, 1; Florida, 2; Georgia, 1; Idaho, 1; Indiana, 1; Louisiana, 1; Maine, 4; Massachusetts, 16; Maryland, 8; Mississippi, 5; New Jersey, 10; Nebraska, 1; New York, 9; New Hampshire, 1; North Carolina, 2; Pennsylvania, 1; South Carolina, 15; Tennessee, 1; Texas, 4; Virginia, 10; West Virginia, 1; and Wyoming, 1.

An engineer from the Office of Public Roads was designated, at the request of the governor of the State of New Hampshire, to make a general road inspection in that State and to report upon the whole situation.[1]

ECONOMIC INVESTIGATIONS.

Heretofore the economic and social benefits accruing to a community by the establishment of a system of improved roads have been a matter of speculation. In order to secure reliable information on this subject, the office inaugurated an investigation in 1910. This study embraces a number of counties in various parts of the United States where funds have been raised from bond issues or otherwise for building an improved system of roads. The counties now under observation are as follows: Spotsylvania, Dinwiddie, Wise, and Lee Counties, Va.; Lauderdale County, Miss.; Dallas and Russell Counties, Ala.; Manatee County, Fla.; Bennington County, Vt.; and Franklin County, N. Y.

The preliminary study was made this year in Franklin County, N. Y., and Bennington County, Vt., and it is quite probable that other counties will be added next year. A preliminary report, based on personal observation and study in each case, was made before the work of road improvement started. The study is to be continued annually until the roads are improved, and as long thereafter as may be necessary in order to obtain complete data regarding the beneficial effects of the improvements.

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[1] For complete information, see Bulletin 42, Office of Public Roads, U. S. Department of Agriculture.

This investigation concerns the methods of financing and administration, the methods and cost of construction and maintenance, and the effects of road improvement on the cost of hauling, character and quantities of production, incoming and outgoing shipments of farm products, valuation of farm lands, school attendance, etc. Much valuable information has already been obtained on these subjects, and it is hoped that, when the investigation is completed and published, it will stimulate road improvement in many parts of the country.

BOND-ISSUE INVESTIGATIONS.

The method of financing road construction by bond issues is becoming very common and is receiving considerable attention from the office, with a view to giving accurate and reliable information to those who contemplate such methods of raising money for road improvement. At the present time the office is collecting from each county and township in the United States where bonds have been issued data regarding the amount of bonds issued, the rates of interest, the dates of issuance and maturity, the assessed valuation of property subject to taxation for road purposes, and the rate of taxes necessary to pay interest and retire bonds. This information will be published as soon as the investigation is completed.

MAINTENANCE EXPERIMENT.

In July, 1911, a contract was made with the board of county supervisors of Alexandria County, Va., under which the Office of Public Roads assumed the experimental maintenance of 8 miles of earth road in the Arlington and Jefferson road districts. By the terms of the contract the county undertook to put the entire mileage of roads in good shape before maintenance was begun. The repairs were completed in December, and maintenance under the patrol system commenced on December 17 and continued during the fiscal year 1912.

The earth road selected consists essentially of three parts—a portion of the Alexandria and Georgetown Road, or north Mount Vernon Road, running north from Nelson's Corner along the east side of the national cemetery for a distance of 2¼ miles to a point where the road is crossed by Rocky Run; the Mount Vernon Avenue Road running south from Nelson's Corner to a point near the old race track at St. Asaphs for a distance of 2¾ miles; and the Columbia Turnpike, running west from Nelsons Corner to the Fairfax County line for a distance of 3 miles. There are on the entire 8 miles of road 4 bridges and 19 culverts. There are also 54 ditch pipes under driveways, 59 intersecting roads, with pipe drains, and 42 intersecting roads and driveways without pipe drains. There are also 10 small wooden bridges across the gutters.

The repairs carried out by the county consisted in shaping parts of the road with a scraping grader, clearing and widening the ditches and clearing culverts, and the application of gravel to portions of the

Columbia Turnpike and the north Mount Vernon Road in the Jefferson district. The cost of repairs was $700.

A patrolman was employed to furnish a horse, cart, and small tools, and he was supplied with a road drag built of plank and required to furnish two horses to drag the road whenever it was in suitable condition for dragging, usually following each rain. The object of this experimental work in maintenance was to demonstrate the results that may be obtained on country earth roads by continuous work under a patrol system.

The entire 8 miles of road is well traveled and there is considerable heavy teaming over parts of the Columbia Pike and the north Mount Vernon Road. The United States Cavalry from Fort Myer frequently passes over the north Mount Vernon Road and the Columbia Pike, and batteries of artillery also use these roads at intervals. The south Mount Vernon Road sustains a large part of the automobile traffic passing south from Washington. A partial traffic census was obtained at intervals during January, February, and March on the Columbia Turnpike by the patrolman. The traffic census for three days in March shows the following average results: Loaded one-horse wagons, 15; unloaded one-horse wagons, 58; loaded two-horse wagons, 38; unloaded two-horse wagons, 49; loaded four-horse wagons, 9; unloaded four-horse wagons, 4; saddle horses, 96; and motor runabouts, 1.

The patrolman was paid $60 per month and $1 a day extra whenever he used two horses to drag the road. His presence was required on the road from 8 a. m. until 4.30 p. m., with one-half hour allowed for lunch. The work of the patrolman is indicated in the following table:

Work of road patrolman on 8 miles of earth road in Alexandria County, Va. (by days).

Month.	Dragging.	Repairing, cleaning, and improving ditches and underdrains.	Picking off stones.	Cutting brush, etc.	Census.	Inspection during storms.	Miscellaneous—clearing away fallen trees, building guard rail, etc.
December	4	9	2	2			
January	2.5	4.5	2	10	3	2	2
February	3	4	0.5	11.5	4		1
March	8	14			3		1
April	11	6.5	3.5	3		1	1
May	7	14	2.5			2.5	
June	3	21					1
Total	38.5	73.0	10.5	26.5	10	5.5	6
Per cent of total	22.7	42.9	6.2	15.6	5.9	3.2	3.5
Cost	$128.89	$169.88	$24.55	$61.78	$23.36	$12.67	$13.86

The average cost of dragging has been $16.11 per mile for 6.5 months, which is at the rate of $29.74 a mile for the first year of 24 complete draggings, or approximately $1.25 per mile for each dragging of three round trips.

The item of $169.88 for repairing, clearing, and improving ditches and underdrains was large, because it was found necessary as the year progressed to rebuild portions of the gutters and ditches entirely.

The following points are clearly demonstrated by the experiment on the 8 miles of earth road in question: (*a*) The use of the road drag has greatly improved the daily condition of the road and rendered it smooth and comfortable for travel for a greatly increased number of days in bad weather; (*b*) a width of earth road in excess of 24 feet is unnecessarily expensive to maintain; (*c*) the presence of the patrolman during storms and immediately after saves considerable expense for repairs due to the wash of surface water; (*d*) the existence of poorly drained private driveways and intersecting roads is a constant expense for maintenance; (*e*) the use of small tiles for ditch drains and the building of wooden bridges over gutters at driveways is a serious obstacle to proper drainage. Small pipe is usually laid at insufficient depth and becomes broken and clogged. It would appear that paved gutters at driveways would not be unduly expensive in the long run and would certainly provide better surface drainage. (*f*) It will not be economical to employ a patrolman during the winter months unless his time can be used to advantage in clearing brush and rubbish from the right of way, but a man should be constantly in charge of every mile of road to inspect it during storms and free the ditches; (*g*) the presence of old cobblestones and large, poorly consolidated gravel is a serious impediment to the use of the road drag; stones must be removed from the road before dragging can be successful; and (*h*) there is ample work for one man continuously during 8 or 9 months of the year, and there is no difficulty in combining road-patrol work with the dragging of earth roads.

During the term of the patrolman the county, in accordance with the contract, has made extraordinary repairs amounting to $207.71. The repairs consisted of rebuilding a concrete head wall for a tiled culvert, which failed during a severe storm, and in rebuilding ditches in the Arlington district; in the Jefferson district regraveling was necessary near the Four Mile Run Bridge, owing to severe flooding, and several loads of gravel were also used to fill depressions at other points on the south Mount Vernon Road.

It is expected to continue this experiment during the fiscal year 1913, and the indications are that the entire 8 miles of road will show remarkable improvement under the systematic work of the patrolman.

SPECIAL AGENTS.

The office endeavors to keep on file prompt and reliable information regarding the road activities in the different States. In order to do this a collaborator is maintained in each State, to report on the 1st of each month on all road matters of importance which have occurred during the preceding month. In States having State highway departments the policy has been to appoint as special agents some one connected with the State highway department. In States not having such departments it has been found desirable to appoint some State official or public citizen in close touch with the road situation in the State. At present collaborators have been appointed in 42 States. Their reports are digested and briefed each month, so as to render the information contained in them easily available for reference, and these data have proved invaluable to the office.

EXHIBITS AND ROAD-IMPROVEMENT TRAINS.

During the past year the office has continued to illustrate the best methods of road making by means of exhibits at expositions and State fairs and on road-improvement trains. These exhibits consist of models and enlarged photographs illustrating the various types of roads and road-building equipment, culverts, and bridges. The models illustrate the construction of earth, sand-clay, gravel, macadam, brick, bituminous macadam, concrete, asphalt, and other standard types of improved roads. The exhibits include models of quarries with miniature crushing plants in actual operation, road scrapers, steam rollers, split-log drags, and other forms of road-building machines and equipment.

The models are built to exact scale and show every important step in the construction of the various types of roads and bridges. These displays have already done much throughout the country to stimulate road improvement and to standardize methods of construction.

During the year the office cooperated with the Southern Railway, the Atlantic Coast Line, the Nashville, Chattanooga & St. Louis Railroad, the Norfolk & Western, and the St. Louis & San Francisco Railroad in the operation of road-improvement trains. These trains usually consisted of one passenger coach in which the road, bridge, and mechanical models and photographic enlargements were installed; one passenger coach for stereopticon lectures; one passenger coach in which a gasoline engine was installed for operating the mechanical models, lights for the stereopticon, and lights and fans for the train; and one officers' car for the accommodation of the representatives of the office and the railroad company. The cars and their transportation were furnished by the railroad companies, while the office furnished the exhibits and one lecturer and one demonstrator for each train.

The tour of the Southern Railroad's road-improvement train started on May 1, 1911, and was completed on October 29, 1911. The train traveled 13,481 miles in the States of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia, visited 210 counties, and stopped at 251 towns, where 288 lectures were delivered to 46,733 persons.

The Nashville, Chattanooga & St. Louis road-improvement train started on October 9 and completed its itinerary on November 11, 1911. It stopped at 55 cities and towns in Alabama, Georgia, Kentucky, and Tennessee, and 75 lectures were delivered with a total attendance of 21,708.

The Atlantic Coast Line road-improvement train was started from Richmond, Va., on November 24, 1911, and completed its itinerary at Lake Butler, Fla., on February 22, 1912. During the trip 155 lectures were delivered by the office representative to 22,000 persons.

The office also cooperated with the Norfolk & Western Railroad and the Missouri, Kansas & Texas Railroad Co. by furnishing a lecturer for their "better farming" trains. The Norfolk & Western train started on December 6, 1911, and completed its work on December 14, 1911. Thirty-five lectures were delivered with a total attendance of 8,818. The Missouri, Kansas & Texas agricultural train started on January 24 and completed its itinerary on February 8, 1912. The office representative delivered 34 lectures with a total attendance of 25,810.

The St. Louis & San Francisco road-improvement train started on March 25, 1912, at Brownsville, Tex., and completed its itinerary at Morocco, Ind., on August 31, 1912. The "Frisco" itinerary included all of the principal towns on its lines in the States of Alabama, Arkansas, Illinois, Indiana, Kansas, Louisiana, Oklahoma, Tennessee, and Texas. In all 248 stops were made and 262 lectures were delivered by representatives of the office. The total attendance was 38,185.

In addition to the exhibits made on road-improvement trains, the office furnished exhibits of road and bridge models and road-building equipment to the State fair, Columbus, Ohio, from August 28 to September 21, 1911; the Industrial Exposition, Milwaukee, Wis., from September 2 to September 10, 1911; the North Dakota Industrial Exposition at Bismarck, N. Dak., from September 26 to October 16, 1911; the Alabama Good Roads Convention, at Selma, Ala., in October, 1911; the Southern Texas fair, Beaumont, Tex., from November 27 to December 2, 1911; the Travel and Vacation Exposition, New York City, from May 23 to May 30, 1912; and the Intermountain Good Roads Association, Logan, Utah, from June 12 to June 15, 1912. The office furnished the War Department with an exhibit of bromide enlargements, illustrating road and bridge construction, for the Insular Fair held at San Juan, P. R., from December 7 to December 12, 1911. An exhibit of models and photographs of bituminous macadam roads, road machinery, and testing apparatus was also given at the International Exposition, Turin, Italy, from April 30 to October 31, 1911. Bromide enlargements were also furnished to lecturers for the Daughters of the American Revolution, the Mothers' Congress, and other organizations for lecture work, and to public schools, etc. In all cases the expense of transportation and drayage of these exhibits was paid by the association or exposition companies interested.

PUBLICATIONS.

During the fiscal year 1911 sixteen publications were issued by this office. Among these, two Farmers' Bulletins were published, one (No. 461) on "The General Use of Concrete on the Farm," and another (No. 505) on "The Benefits of Improved Roads." Both of these have been popular publications. The concrete bulletin was widely distributed among cement manufacturers and farmers, and it is believed that it has been of great value to persons working on a small scale because of the simple directions offered in it. Farmers' Bulletin No. 505 supplies to a certain degree a long-felt want for a publication telling of the economic value of good roads.

Nine bulletins of the office were issued, as follows: Bulletin 36, Descriptive Catalogue of Road Model Exhibit; 37, The Examination and Classification of Rocks for Road Building; 38, Methods for the Examination of Bituminous Road Material; 39, Highway Bridges and Culverts; 40, The Road Material Resources of Minnesota; 41, Mileage and Cost of Public Roads in the United States in 1909; 42, New Hampshire Highways; 43, Highway Bridges and Culverts (revision of Bulletin 39); and 44, The Physical Testing of Rocks for Road Building. Bulletin No. 36 is one of the most important of our bulletins. It supersedes a publication which was originally prepared for the Alaska, Yukon and Pacific Exposition, and is now widely used by the road trains. No. 37 is a revision of Bulletin 31. No. 38 should be used in connection with Bulletin 34 and explains the methods used in the Chemical Laboratory of this office for testing tar and oil dust preventives. Bulletin 39 is the first publication of this office on the subject of bridges and culverts; other publications on this subject will be issued during the coming fiscal year. Bulletin No. 40 is the second of the series of bulletins telling of the road-material resources in the various States of the Union. No. 41 is the result of a very elaborate inquiry dealing with mileage and road expenditures throughout the United States. The edition of this bulletin was very limited, and a second edition has been issued as House Document No. 582. No. 42 deals with a special investigation concerning New Hampshire highways, prepared by this office with the cooperation of the governor of New Hampshire. It is the most elaborately illustrated of any of the publications of this office. No. 43 is a revised edition of Bulletin 39. Owing to misunderstanding among engineers as to the scope of assistance offered by this office, it was deemed necessary to issue No. 39 in a revised form, which would explain more fully just what the office is prepared to undertake in the field of bridge engineering. No. 44 is a very complete account of the rock tests conducted by this office and by the Massachusetts State Highway Commission before the testing laboratory was established in this office. To a certain extent this publication is a revision of Bureau of Chemistry Bulletin 79, which was issued in 1903.

Two circulars were issued, both dealing with studies of bituminous products. Circular 96 treats of "Napthalene in Road Tars," and Circular 97 is entitled "Coke-Oven Tars in the United States."

Two yearbook articles were published separately after appearing in the Yearbook for 1911. These are No. 535, "Progress and present status of the good-roads movement in the United States," and No. 538, "Bituminous dust preventives and road binders."

The foregoing documents, together with the Annual Report of the Office of Public Roads for 1911, make up the 16 publications which were issued during the past fiscal year.

During this year the work of preparing a bulletin on the subject of "Oil-mixed Portland-cement concrete," was completed, but since the bulletin was not published in the fiscal year 1911 it will be discussed in the next annual report.

New publications are in course of preparation on the following subjects: The condition and administration of roads in foreign countries; road maintenance; short-span bridges and culverts; inorganic road materials; the work of the office of public roads; the expansion and contraction of concrete roads; the preparation of refined water gas tar binders; the methods of testing bituminous road materials (supplementary to bulletin 38); and the investigation of reinforced concrete slabs.

THE LIBRARY.

The library of this office contains about 5,000 volumes. The collection of State publications from the highway departments, geological surveys, agricultural departments, experiment stations, and other State offices which publish information of interest to highway engineers is practically complete. The office has received the city engineer's reports, in most cases for the five preceding years, from more than two-thirds of the cities of the United States having more than 5,000 inhabitants. The office has also received large collections of city engineer's reports from Australia, Austria, Belgium, British Guiana, Canada, China, Costa Rica, Cuba, Denmark, Ecuador, Egypt, England, France, Germany, India, Ireland, Italy, Jamaica, the Netherlands, Norway, Peru, Roumania, Russia, Salvador, Scotland, Straits Settlements, Sweden, Switzerland, and the Union of South Africa.

Seventy-two periodicals are now received at the library, of which 31 are received by contribution from the department library and 41 are mailed directly from the publishers. Of these periodicals, 59 are filed permanently in the library of the Office of Public Roads, while 13 are returned to the department library for further distribution.

The library is now practically entirely catalogued. This work has been pushed very rapidly of late and a great many volumes have been classified and are now thoroughly represented by author and subject cards.

PHOTOGRAPHIC LABORATORY.

The work of this laboratory during the year involved the development of 305 rolls of films and required making 515 negatives, 593 bromide enlargements, 2,381 lantern slides, and 13,875 prints. During the year 1,705 lantern slides for lecture work were colored by the artist of the office.

At the present time the office has 8,237 negatives on file, of which 2,237 were added this year. Photographic records of all object-lesson and experimental work and of all roads on which economic studies are being made are kept on file in the office.

CLASSIFIED EXPENDITURES FOR 1912, BY PROJECTS.

Expenditures for fiscal year ended June 30, 1912, by projects.

Appropriations:	
Statutory, Office of Public Roads	$34,020.00
Road management	20,000.00
Investigating road building and maintenance	54,000.00
Road material	23,830.00
Field experiments	16,000.00
Administrative expenses	12,870.00
Total appropriation	160,720.00

Projects:	
1. Object-lesson roads	$13,557.40
2. Instruction in highway engineering	8,541.92
3. Testing road materials (included in report for No. 31).	
4. Road management and accounting (included in report for No. 32).	
5. Lectures, addresses, and papers	16,812.04
6. Special inspection and advice	9,529.49
7. Dust prevention and road preservation (included in report for No. 30).	
8. Standardization of tests	2,065.53
9. Introduction of model systems of construction, maintenance, and administration	3,106.34
10. Investigation of road materials in the several States (included in report for No. 31).	
11. Sand-clay and burnt-clay roads (included in report for No. 1).	
12. Burnt-clay roads	--------
13. Investigation of slag	800.00
14. Cooperation with county newspapers (included in report for No. 5).	
15. Corrosion of iron and steel	--------
16. Split-log drag (included in report for No. 6).	
17. Classification of road materials (included in report for No. 31).	
18. Bibliography on roads	--------
19. Administration and equipment	47,222.42
20. Traction tests	--------
21. Inspection of rural-delivery roads	--------
22. Illustrated lecture, photographic and record work	6,148.96
23. Cooperation with experiment stations	--------
24. Cooperation with Forest Service	--------
25. Bridge investigations	3,718.35
26. Bulletins	1,221.46
27. Economic investigations (included in report for No. 32).	
28. Oil-concrete investigations	1,775.63
29. Surveys	2,805.08
30. Experimental roads	22,426.66
31. Testing, investigating, and classifying road materials	9,836.42
32. Road management and economic investigations	7,625.43
33. Road maintenance investigations	755.42
Total expenditures	157,948.55
Liabilities outstanding, miscellaneous rolls (estimated)	628.30
Balance unused, miscellaneous rolls (estimated)	1,923.41
Balance unused, statutory roll	219.74
Total appropriation	160,720.00

OUTLINE OF PLANS FOR THE CURRENT YEAR.

The appropriation for the current fiscal year amounts to $202,120, which is an increase of $41,400 over the appropriation for the year 1911–12. It is planned to increase the scope of the work in all of the projects for which additional appropriations were provided and to continue the work along other lines as heretofore.

At its last session Congress made an appropriation of $500,000 to be expended for road improvement. Plans are now under way for the cooperation of the Office of Public Roads with the Post Office Department to carry on this work. Under the provisions of the law it is necessary for the locality in which road improvement is undertaken to appropriate 66⅔ per cent of the cost of such improvement.

PLANS AND RECOMMENDATIONS FOR 1914.

The estimates for the fiscal year 1913-14 provide that the appropriations of the office be increased from $202,120 to $386,240. The lines of work for which these increased appropriations are requested and the amounts of increase for each are as follows:

Lines of work.	Appropriation for 1912-13.	Increase recommended for 1913-14.	Total appropriation recommended for 1913-14.
Statutory salaries	$37,020	$17,380	$54,400
Road-management	25,000	31,500	56,500
Road-making investigations	75,000	89,660	164,660
Road material investigations	25,000	10,580	35,580
Field experiments	30,000	30,000	60,000
Administrative expenses	10,100	5,000	15,100
Total	202,120	184,120	386,240

The reasons for the increases recommended are stated in detail in the Book of Estimates.

It is apparent that if Congress grants the additional appropriations above recommended the scope of the work of the office will be largely increased.

With a view to uniformity throughout the department, it is respectfully suggested that the name "Office of Public Roads" be changed to "Bureau of Public Roads."

REPORT OF THE SOLICITOR.

U. S. Department of Agriculture,
Office of the Solicitor,
Washington, D. C., October 1, 1912.

Sir: I submit herewith the report of the work of the Office of the Solicitor for the fiscal year ended June 30, 1912.

Very respectfully,

Geo. P. McCabe,
Solicitor.

Hon. James Wilson,
Secretary of Agriculture.

OUTLINE OF OFFICE WORK.

New duties devolving upon the office in connection with the examination of titles to lands recommended by the National Forest Reservation Commission for purchase under the Weeks Forestry Act of March 1, 1911, and the approval of claims for relief arising out of services rendered in suppressing forest fires in 1910, presented under the deficiency act of March 4, 1911, together with the normal growth of the department's business, increased the volume of work of this office during the fiscal year 1912 beyond that of any previous year. The vigilance of the department's inspectors and other officers engaged in detecting violations of the acts for the protection of the National Forests, of the food and drugs act, the meat inspection law, the twenty-eight hour law, the animal quarantine laws, the insecticide and Lacey Acts, has resulted in the preparation by this office of a much greater number of cases for prosecution by the Department of Justice. With the greater number of cases there has been a corresponding increase in the preparation of briefs and in correspondence with the Attorney General and the United States attorneys on the legal questions involved. The numerous requests for assistance in the preparation and prosecution of cases have been complied with promptly, and cordial cooperation with the prosecuting officers of the Government has produced gratifying results.

Frequent advice has been given to the several bureaus, divisions, and offices on questions of law relating to the discharge of the varied duties intrusted to them.

The Solicitor attended all the hearings conducted by the House Committee on Expenditures in the Department of Agriculture as the representative of the department.

Notwithstanding the increase in the business of the office, the force in Washington was not augmented during the year. All the employees were required to work beyond the customary hours from time to time, and their work has been done creditably and expeditiously.

The vigorous enforcement of the food and drugs act continued throughout the year. Fourteen hundred and fifty-nine violations were reported to the Department of Justice for action, an increase of more than 25 per cent over the number of violations reported during the fiscal year 1911, and of 47 per cent over the number reported during the fiscal year 1910. Of the total number of cases, 991 were criminal cases and 467 were recommendations for the seizure of adulterated or misbranded foods and drugs. There were 741 cases prosecuted by the United States attorneys during the year. Of the criminal cases prosecuted, 381 resulted in convictions; 23 were decided adversely to the Government. Fines were imposed in the criminal cases amounting to over $14,000, and, in addition, costs were assessed generally against the defendants. Of the cases reported during the year, 407 were pending in the courts at its close and 376 were under consideration by the Department of Justice.

The first jail sentences for violations of this act were imposed during the year, and there was a tendency on the part of the courts to impose larger fines for first offenses. The maximum fine of $200 was imposed in 12 cases, and there were also imposed 1 fine of $150, 36 fines of $100 each, 2 fines of $75 each, and 61 fines of $50 each. In 1911 the maximum fine of $200 was imposed in 16 cases, and there were imposed 4 fines of $150 each, 1 fine of $125, 26 fines of $100 each, 1 fine of $75, and 33 fines of $50 each. There was also imposed a fine of $400 in 3 cases prosecuted where several different adulterated and misbranded articles were contained in one shipment. It will be noted that while there was a slight decrease in the number of maximum fines imposed during 1912, there was a very substantial increase in the number of cases in which fines of $100 and $50 were imposed.

In the seizure cases decrees of condemnation and forfeiture were entered against 294 shipments of adulterated and misbranded goods. In accordance with the usual practice, whenever seized articles of food were found to consist of filthy, decomposed, or putrid substances, or to contain added poisonous or deleterious ingredients which might render them injurious to health the department has insisted that orders be entered directing the destruction of the goods. One hundred and three shipments of this class were destroyed. On the other hand, in the class of cases where the adulteration or misbranding was such that it could be cured by relabeling, the courts have usually released the seized goods to claimants after relabeling whenever claimants have appeared and consented to the entry of decrees of condemnation and forfeiture, paid the costs of the proceedings, and filed bond, as provided for by section 10 of the act, that the goods would not thereafter be sold or otherwise disposed of contrary to law. One hundred and sixty-two shipments of this class of cases were released during the year after relabeling and the filing of satisfactory bonds. There have been seized and condemned shipments of sardines, figs, herring, dried apples, dried cherries, condensed milk, pie filling, cold cream ointment, soft drinks, candies, cordials, chestnuts, oysters, tomato pulp, frozen eggs, bottled water, apples, peanuts, turpentine, sparkling burgundy, brandy, vanilla extract, dried blackberries, dried eggs, liqueurs, butter, vinegar, prunes, witch-hazel, and hay.

In several instances cases have been reported for criminal prosecution based on shipments of seized goods found to consist of filthy, decomposed, or putrid substances, or to contain added poisonous or deleterious ingredients which might render them injurious to health. Four cases were discontinued on account of lack of evidence to maintain them. In 18 cases seizures were not made because the goods had been disposed of prior to the filing of libels. In one seizure case the court refused to issue process, and in another the proceedings were dismissed.

Notices of Judgment in the terminated cases have been prepared by this office promptly on receipt of necessary records from the United States attorneys. Six hundred and five of such notices were published during the year and over 300 more were in course of preparation at the close of the year. As heretofore, advance copies of the notices have been forwarded to the officials of the several States authorized to cooperate with the department in the enforcement of the law.

During the fiscal year 1912 the Solicitor rendered 93 formal and 1,148 informal written opinions to the Forest Service on the legal phases of questions arising in connection with the administration of the National Forests. One thousand two hundred and fifty contracts, leases, bonds, and right-of-way stipulations were prepared and examined for sufficiency of execution. One thousand five hundred and sixty-eight cases involving contested claims to lands within the National Forests were handled during the year. These cases involved upwards of 400,000 acres of land, supporting many million feet of valuable merchantable timber. Final action was taken by the Secretary of the Interior or the Commissioner of the General Land Office in 622 of the above cases, of which 462 were decided favorably to the United States. The office filed 241 briefs in contested claims cases during the year and prosecuted 21 appeals, with accompanying briefs, to the Secretary of the Interior from adverse decisions of the commissioner, and made five oral arguments before the Secretary. Depositions were taken by the office in 75 cases. Regulations for the administration of the National Forests were revised during the year and upward of 50 proclamations and executive orders eliminating lands from the National Forests were either prepared or passed upon by the office. The office handled 406 cases of grazing, timber, fire, and occupancy trespasses on the National Forests. Those which were concluded favorably to the Government during the year resulted in the payment into the Treasury of $67,322.54, and in several criminal cases substantial jail sentences were imposed. Punitive, in addition to actual damages, in the sum of $704.70 were recovered during the year in cases involving illegal grazing on the forests. The office passed upon 56 applications for power permits and heard two oral arguments of attorneys for applicants for conflicting permits. Upward of 60 complaints, briefs, and indictments were prepared at request of the United States attorneys during the year; 123 claims for relief and reimbursement under the appropriations made by Congress in consequence of the forest fires in the fall of 1910 were examined by the office. Thirty-nine contracts for the purchase of lands for the protection of watersheds of navigable streams under the act of March 1, 1911, were prepared during the year.

Six hundred and thirty-one violations of the twenty-eight hour law were reported for prosecution, as compared with 598 cases reported in the fiscal year 1912. Penalties were recovered in 357 cases, amounting to $28,400. Costs were assessed against the defendants in these cases amounting to $2,937.13. In the fiscal year 1911 penalties amounting to $26,075 were recovered in 258 cases, with costs in the sum of $5,783.85. There were 967 cases pending at the close of the year, as compared with 807 cases pending on June 30, 1911.

One hundred and thirty-five violations of the live stock quarantine acts were reported for prosecution. Of these, 124 were violations of the act of March 3, 1905 (33 Stat., 1264), and 11 were violations of the act of May 29, 1884 (23 Stat., 31). The total number of cases of this class exceeded the number reported during the preceding fiscal year by 35 per cent. Fines aggregating $6,125 were imposed in 68 cases prosecuted during the year, and the costs of the proceedings were uniformly assessed against the defendants. In 1911 fines were imposed in 51 cases, amounting to $5,580.

Eighty-five violations of the meat-inspection amendment (34 Stat., 674) were reported for prosecution, a decrease in number of 16, as compared with the fiscal year 1911. Sixty-five cases were prosecuted successfully during the year, and fines were imposed amounting to $4,746.75. In 3 cases sentences of imprisonment were imposed. In the fiscal year 1911 fines amounting to $3,240 were imposed in 43 cases. Four cases resulted in verdicts for the defendant in the fiscal year 1912. In 1911 but one case was terminated adversely to the Government. At the close of the fiscal year 71 cases were awaiting prosecution.

The first apparent violation of the insecticide act of 1910 was reported for prosecution in December, 1911. In all, 58 cases under this statute were reported during the year. Six of these cases resulted in convictions and in one a decree of condemnation and forfeiture was entered. The goods in the latter case were subsequently released to the claimants under bond after payment of the costs. The Insecticide and Fungicide Board has completed its organization for obtaining evidence of violations of this statute.

Thirty-four cases involving the unlawful shipment of game were reported for prosecution under the Lacey Act (secs. 242 and 243, Penal Code). The Biological Survey has arranged, through cooperation with State officials, to trace such shipments more effectively, and it is expected that this plan will contribute materially to the detection of violations of this statute. Six cases presented during the year 1912 resulted in convictions. In one case the defendant was acquitted.

Three hundred and fifty-seven contracts and leases were prepared for the several bureaus, offices, and divisions of the department, in addition to those prepared for the Forest Service in the field. During the fiscal year 1911, 339 contracts and leases were prepared for the same bureaus, offices, and divisions.

Nineteen applications for letters patent on inventions of employees of the department, for dedication to the public, were filed in 1912, more than double the number filed in 1911. Ten patents were allowed during the year and 2 were disallowed. In 1911, 10 patents were allowed and there were no disallowances.

The office system of files and indexes was revised during the year. The files are now arranged on a subjective basis, and card indexes have been discontinued, with the exception of record indexes of cases reported to the Department of Justice for prosecution. The new system has proven both economical and efficient. The handling of the work of the office by sections has been continued, and the work has been kept current. All the employees in the office maintain a live interest in the performance of their duties, and each of them is entitled to a share of credit for the expeditious transaction of the legal business of the department.

The tabular statements appended to this report show in detail the facts and status of the principal prosecutions originating in the department in which the United States attorneys have begun proceedings, and of the claims and other matters affecting the administration of the National Forests, with which the office is concerned.

ADMINISTRATION OF THE ACTS OF CONGRESS.

THE FOOD AND DRUGS ACT.

During the first quarter of the fiscal year just ended the method of handling the food and drugs cases was prescribed by General Order 140 of the Secretary, and under this order 364 cases were considered as to whether they should be prosecuted or abated and 655 cases were considered as to whether or not the interested parties should be cited to hearing, and 1,367 analytical cards were examined for the purpose of determining whether or not further action should be taken thereon looking to the institution of proceedings under section 2 of the act.

On October 3, 1911, General Order 140 was modified by General Order 147, which transferred to the Board of Food and Drug Inspection of the department the duty of determining whether citations for hearing should be issued to interested parties and as to whether cases after hearings had been held should be reported to the Attorney General for prosecution or abated. The order prescribed that all cases in which a majority of the board decided legal proceedings should be instituted were to be prepared for prosecution by the Solicitor's office and reported to the Attorney General. All cases which the Board of Food and Drug Inspection has recommended for prosecution since the date of the order have been carefully prepared for reference to the Department of Justice, and all questions relating to the prosecution of cases before reported have been submitted to the board for decision.

This office has, in addition to the preparation and reporting of said cases, conducted a large volume of correspondence with the various United States attorneys relative to pending proceedings and has, upon request, in several instances prepared briefs upon legal points, and in several cases where requests have been made by United States attorneys have assisted in taking testimony for depositions.

Investigation by the department into the milk supply of St. Louis, Mo., the source of which was neighboring towns in the State of Illinois, showed that large quantities of milk contaminated by filth and otherwise adulterated under the act were being shipped interstate. As a result of this investigation 238 cases involving the adulteration of milk were prepared against various shippers in the State of Illinois and reported to the Attorney General for prosecution.

A like investigation into the milk supply of Providence, R. I., resulted in the report of 70 cases to the Attorney General by this office for prosecution in the district of Connecticut where the shipments originated. In a number of these milk cases the defendants have pleaded guilty. In the remainder of the cases proceedings had already been instituted and the cases were pending in the courts at the close of the fiscal year 1912.

During this year the Supreme Court of the United States, in the case of the United States *v.* Morgan (220 U. S., 274; Office of Solicitor Circular 58; Notice of Judgment 1992), rendered a decision of great importance in the administration of the food and drugs act. This case involved the interstate shipment by the defendants, John and Albert Morgan, of misbranded spring water from New York to Newark, N. J. The case was tried before a jury in the Circuit Court of the United States for the Southern District of New York. The proceeding was by indictment, which alleged the interstate shipment and misbranding of the product, but failed to allege that a preliminary hearing had been afforded by the department to the defendants before the institution of criminal proceedings. The jury returned a verdict of guilty, but the trial judge granted a motion on behalf of the defendants for arrest of the judgment, holding that it was essential to allege the notice and hearing mentioned in section 4, such notice being jurisdictional and a condition precedent to the institution of prosecution upon a report of the Secretary of Agriculture. From the decision of the trial court the Government appealed to the Supreme Court of the United States, which reversed the judgment of the lower court. The decision of the Supreme Court is of far-reaching importance in its administrative aspect, as it holds, in effect, that the notice and hearing required to be given parties from whom samples of food and drugs are procured by the department for purposes of investigation are not jurisdictional facts, and consequently it is not essential that they be alleged in an indictment or information, and so need not be proven at the trial of the cases. Moreover, the decision practically repudiated the doctrine laid down by the circuit court of appeals for the second circuit in the case of United States *v.* 20 Cases of Grape Juice (189 Fed. Rep., 331), in which it was held that the notice and hearing mentioned in section 4 of the act had reference also to the proceedings instituted under section 10, and that consequently such notice and hearing were conditions precedent to the filing of libels against the adulterated and misbranded articles on reports of the Secretary of Agriculture.

The decision in the grape-juice case was a source of considerable embarrassment to the department during the past year in effecting seizures of adulterated or misbranded goods pursuant to section 10 of the act, especially in those jurisdictions where it was followed, namely, in the southern and western districts of New York and the eastern district of Pennsylvania. Under this decision seizures could not be made effectively in such jurisdictions, since the department would be subjected to the delay incident to the preliminary hearing. The decision in United States *v.* Morgan, while rendered in a criminal case, has been accepted as applying also to seizure cases under the act, so that the department in all jurisdictions, since the rendition of said decision, may proceed to institute seizures of adulterated or misbranded articles under section 10 of the act without the burdensome restriction imposed by the decision of the circuit court of appeals in the grape-juice case.

The Supreme Court also dismissed the petition for a writ of certiorari in the case of Warner-Jenkinson Co. *v.* the United States (Supreme Court, No. 812, October term, 1911, unreported), by which it was sought to review a judgment of the circuit court of appeals for the fifth circuit affirming a decree of condemnation and forfeiture by the District Court for the Western District of Texas, in the case of United States *v.* 1 Barrel of Vanilla Extract, N. J. 1166.

The circuit court of appeals for the second circuit, in the case of Steinhardt Bros. Co. *v.* The United States (191 Fed. Rep., 798, Office of Solicitor, Circular 57), in affirming the judgment of conviction by the Circuit Court for the Southern Circuit of New York (N. J., 501) for violation of section 2 of the act in shipping interstate a quantity of alleged Damiana Nerve Invigorator, which was misbranded, held that the guaranty contemplated by section 9 of the food and drugs act, to afford protection to the party making an interstate shipment of the adulterated or misbranded article, must have been given prior to such shipment. In this case the court also ruled, in effect, that where there is controversy as to whether an article alleged to be misbranded is a food or a drug within the definition in the act and said article is described both ways in separate counts of the information charging the offense, the Government is not required to elect on which of the two counts to try the defendant.

This same court, in Von Bremen et al. *v.* The United States (192 Fed. Rep., 904), reversed the conviction of the defendant by the Circuit Court for the Southern District of New York, for shipping interstate a quantity of salad oil alleged to be adulterated and misbranded because the same was not olive oil. The appellate court held that the trial court committed reversible error in the case by refusing to permit the defendants at the trial to introduce testimony from dealers as to the meaning of the term "salad oil" in the trade. The case of Brina *v.* The United States (179 Fed. Rep.), decided by this same court, wherein it was held that "salad oil" prima facie meant olive oil, is distinguished by the court in the later opinion.

The circuit court of appeals for the third circuit, in the case of The United States *v.* 443 Cans of Frozen Egg (H. J. Keith Co. claimant) (193 Fed. Rep., 589; Notices of Judgment 1027 and 1576) reversed the decree of the District Court of New Jersey dismissing the libel filed by the Government against a quantity of frozen egg alleged to be filthy and decomposed. This case was vigorously contested by claimants, both at the trial and upon appeal, and a great volume of expert testimony was submitted both by the Government and the claimant upon the issue of adulteration. The appellate court held that the tests of the product made by the Government's experts, which were testified to at the time of the trial, established the decomposition of the product and directed a decree of condemnation and forfeiture to be entered by the lower court against the product. The court in its opinion announced a guiding principle in the determination of whether an article is adulterated within the meaning of the act by reason of decomposition, namely, that where a product is so near decomposition that exact chemical and thermal precautions are necessary to prevent decomposition then the product is as an article of food so close to the danger line as to excite suspicion and demand the closest judicial scrutiny before it is allowed to become an article of food consumption, and that the condition of the product in the hands of the consumer is a place and time to test its fitness for food.

Claimant is seeking to have this decision reversed by the Supreme Court of the United States.

The Circuit Court of Appeals for the Fifth Circuit has construed the word "Compound," as used in section 8 of the act, in Henning & Co. *v.* United States (198 Fed. Rep., 52; Notice of Judgment No. 1529). The opinion was rendered on appeal by the company from the decree of the District Court for the Eastern District of Louisiana, condemning and forfeiting the product in a seizure proceeding under section 10 of the act, against 14 barrels of so-called compound catsup, alleged to be adulterated and misbranded because it contained pumpkin seed, which ingredient was not stated. It was contended by appellants that the word ''compound'' on said label brought the product within the proviso of section 8, paragraph 4, providing that an article which was plainly labeled so as to indicate that it was a compound should not be deemed to be adulterated or misbranded when it contained no poisonous or deleterious ingredient. This department, however, has always insisted upon the view that a compound article of food, to be properly labeled within the purview of the paragraph in question, must be labeled so as to show two or more of the ingredients entering into said compound. The circuit court of appeals in the foregoing opinion sustained the view held by this department. In Hudson Manufacturing Co. *v.* The United States (192 Fed. Rep., 920; Notice of Judgment No. 1451) this same court affirmed a decree of condemnation and forfeiture of a product labeled ''Hudson's Extract * * *.'' The court held—

> That where there is no proof that the words ''Hudson's Extract'' have a well-known trade meaning, an imitation vanilla marked ''Hudson's Extract,'' without giving any indication of what the article is composed, shows a clear case of misbranding under the pure-food law.

The Circuit Court of Appeals for the Sixth Circuit has also construed the word ''compound'' in the act, in the case of Frank et al. *v.* The United States (192 Fed. Rep., 864), sustaining a conviction of the defendant, upon an information charging interstate shipment of a product labeled ''Compound White Pepper,'' in prominent type, and less conspicuously on another part of the label naming the ingredients of said compound. Misbranding was alleged by reason of the failure to properly qualify the words ''Compound White Pepper'' by a conspicuous statement of the ingredients. (See Notice of Judgment No. 835.) The appellate court held against the contention of appellants that the term ''compound'' as used on the label necessarily implied that the article was composed of pepper and other ingredients.

The court also decided in this case that a violation of section 2 of the food and drugs act was a petty offense as distinguished from a crime, requiring the trial by jury under section 2 of article 3 of the Constitution.

During the period covered by this report the first jail sentence was imposed for a violation of the food and drugs act in the case of United States *v.* Alberto Milanesi, trading as the Lucca Wine Importing Co.

This case was tried in the United States District Court for the Southern District of New York, and grew out of an investigation by the department into the shipment by the defendants of liquor which was dangerously adulterated with methyl alcohol. The case was reported for prosecution under the food and drugs act, but the facts also showed a conspiracy on the part of the defendants to evade the provisions of that act by secretly shipping liquor from New York to themselves at rented premises at Hoboken, N. J. The United States attorney therefore proceeded under section 37 of the Criminal Code, with the result that Alberto Milanesi, the principal defendant, was sentenced to serve a term of seven months' imprisonment at Blackwell's Island. (Notice of Judgment No. 1754.)

In United States *v* One Hundred Barrels of Vinegar, Spielman Bros. Co. (188 Fed. Rep., 471; Notice of Judgment 1159), the Government succeeded, after a contest, in establishing the view of this department with respect to the adulteration and misbranding of cider vinegar. In this case the departmental methods of analysis and the expert testimony submitted by the department were vigorously attacked, but the verdict and judgment sustained the Government's position.

In the case of United States *v.* Seventy-five Barrels of Vinegar, Spielman Bros. Co., claimant (192 Fed. Rep., 350; Notice of Judgment No. 1441), a seizure proceeding instituted in the United States District Court for the Northern District of Iowa, the Government, after a contest by the claimant upon practically the same questions raised in the Minnesota vinegar case, secured a verdict of the jury sustaining its contentions. The court in this case in explicit terms refused to follow the opinion of the United States Circuit Court of Appeals for the Second Circuit in United States *v.* Twenty Cases of Grape Juice (189 Fed. Rep., 331), which at the time was being accepted as authoritative in other jurisdictions on the question of compelling a preliminary hearing by the Secretary of Agriculture in seizure cases as a condition precedent to filing a libel against adulterated or misbranded articles of food.

In seizure proceedings instituted by the department involving confectionery, in the District Court of Massachusetts, claimants obtained a verdict from the jury on the question of adulteration of the products. The Government contended that the products in question, candy eggs, candy peaches and pears, were adulterated by reason of containing talc, an ingredient deleterious and detrimental to health. (Notice of Judgment No. 1642.) The Government has perfected an appeal in the above cases, and the same is now pending in the circuit court of appeals for the first circuit.

The Supreme Court of the District of Columbia, after a contest, entered a decree of condemnation and forfeiture of 350 sacks of Princess flour and 50 sacks of fancy Melba flour found to be adulterated by the department by reason of being infested with worms and worm excreta. Claimants have appealed from the foregoing decree, and the case is now pending on appeal in the court of appeals for said District.

In the case of United States *v.* Marchesini (Notice of Judgment No. 1624), a criminal prosecution for an interstate shipment of adulterated and misbranded olive oil from New York to Pennsylvania, the defendant was convicted after a trial by jury in the District Court of the United States for the Southern District of New York and was sentenced to pay a fine of $300 and to 10 days imprisonment in the county jail. Subsequently the imprisonment was remitted by the court.

The case of United States *v.* Schaefer (Notice of Judgment No. 1351), tried in the United States District Court for the District of Maryland, resulted in a verdict of not guilty. Defendant was charged with shipping interstate a quantity of candy alleged to be misbranded because it contained a resinous substance, the presence of which was not declared on the label. The department failed in this case to sustain its position that it is necessary to declare coating material used on candy without proof that the coating is harmful or conceals inferiority.

The circuit court of appeals for the eighth district still has under advisement claimant's appeal in the Kansas City Bleached Flour Case, which was argued and submitted during the fiscal year 1911.

The case of United States *v.* Forty Barrels and Twenty Kegs of Coca Cola is still pending on the Government's appeal before the United States Circuit Court for the Sixth Circuit.

The case of United States *v.* One Hundred Packages of Anti-Kamnia Tablets is now pending in the Supreme Court of the United States on appeal by the Government from a decree of the Court of Appeals for the District of Columbia, which affirmed a decree of the Supreme court of said District favorable to the claimant.

In the case of United States *v.* The American Chicle Co., tried in the District Court of the United States for the District of Oregon, the jury returned a verdict of guilty and defendant was fined $100 and costs. The case involved the interstate shipment of a quantity of chewing gum labeled "Beeman's Pepsin Gum," which was held to be misbranded because it contained but a trace of pepsin. The verdict in this case upholds an important contention of the Government that where an article contains but a trace of a valuable ingredient it is misbranded if named after that ingredient alone.

Among the important prosecutions instituted by the department in the Southern District of New York were two cases against the Farmers' Loan and Trust Company and Henry B. Corey, conducting business as Alart & McGuire (Notice of Judgment 1552). This case involved the interstate shipment of one consignment of mustard alleged to be misbranded because it contained turmeric, an artificial coloring matter not a normal ingredient of prepared mustard, and a second consignment of prepared mustard alleged to be misbranded because it contained both turmeric and wild mustard or charlock, which were not declared on the label of the product. The cases were consolidated and brought to trial before the court and a jury, and after both the Government and defendant had submitted testimony upon the question of whether the substances named were normal ingredients of prepared mustard, the court directed a verdict of not guilty.

Two cases against the Bettman-Johnson Co., of Cincinnati, Ohio (Notice of Judgment 1664), involving the interstate shipments of misbranded Maraschino cherries, were tried during the year in the District Court of the United States for the Southern District of Ohio and in both cases defendant was found guilty by a jury and sentenced to pay fines amounting to $100 and costs aggregating $73.06. The cases are important in that the Government has, after a contest by the defendant, succeeded in establishing to the satisfaction of a court and jury the position taken by this department that the article labeled as Maraschino cherries, without qualification, should be packed in Maraschino cordial or liqueur produced in Dalmatia, Austria.

An important question involving the construction of section 2 of the food and drugs act was decided in favor of the Government by the United States District Court for the Southern District of Ohio in the case of United States *v.* The Dr. J. L. Stephens Co. and is now pending on appeal by the defendant in the United States Circuit Court of Appeals for the Sixth Circuit. The case grows out of a shipment from Ohio into the District of Columbia by the defendant company (which operates a sanitarium for the cure of drug habitues at Lebanon, Ohio, and also conducts treatment for the cure of drug habit by mail) of a quantity of medicine containing alcohol and opium, which substances were not declared on the label of the package containing said medicine, as required by section 8, paragraph 2, in the case of drugs. The shipment was made in response to an application for treatment and a remittance sent by an inspector of this department to the defendant company. The case was tried upon an agreed statement of facts. Two contentions were made by the defendant as to the proper construction of section 2—first, that the information failed to charge a shipment of the article in an original, unbroken package, and therefore failed to charge an offense under section 2 of the act; second, that the act does not apply to the interstate shipments of medicines compounded from a prescription of a regularly licensed, practicing physician, as in the present case. The court decided adversely to the defendant upon both these points and imposed a fine of $50 and costs. The defendant has sued out a writ of error in the Circuit Court of Appeals for the Sixth Circuit, which will review the judgment of the trial court.

In the case of United States *v.* J. L. Hopkins Co. an information was filed against the defendant in the Circuit Court of the United States for the Southern District of New York charging the interstate shipment of a quantity of broken senna alleged to be adulterated in that it differed from the standard of strength, quality, and purity laid down in the United States Pharmacopœia and alleged to be misbranded in that it was labeled so as to indicate that it was composed entirely of broken senna leaves, whereas, in fact, it contained seeds, stalks, and other foreign matter. The defendant moved to quash the information and the court granted the motion insofar as it related to the adulteration charge. The court, however, denied the motion in regard to the misbranding charge, and this question was submitted to the jury upon the evidence and the jury returned a verdict of not guilty.

In the case of United States *v.* The Piso Co., a prosecution for the interstate shipment of a quantity of "Piso's Cure * * * For Coughs and Colds," alleged to be misbranded in that the amounts of chloroform and cannabis indica in the product were less than the amount stated on the label, the jury in the District Court of the United States for the Western District of Pennsylvania rendered a verdict of guilty. Upon a motion by defendant for a new trial and arrest of judgment the court set aside the verdict on the ground that the evidence did not justify the finding of the jury. In view of the attitude of the court in this case a second trial was not pressed by this department.

The cases of United States *v.* The Clifton Forge Ice and Bottling Works, involving interstate shipments of ice cream alleged to be adulterated in that it was filthy and decomposed, which were tried during the fiscal year 1911 in the United States District Court for the Western District of Virginia, and which resulted in a disagreement of the jury, are still pending in said court awaiting retrial, which was requested by this department. Steps have been taken to secure new evidence for presentation at the retrial set for the coming term of the court in February, 1913.

A large quantity of sardines shipped by L. D. Clark & Sons, Eastport, Me., to Pittsburgh, Pa., were made the subject of seizure proceedings under section 10 of the act in the District Court of the United States for the Western District of Pennsylvania, in a case entitled United States *v.* 1,938 Cases Sardines. Adulteration was charged for the reason that said fish were filthy and decomposed. The case was contested by L. D. Clark & Sons and extensive testimony, both oral and by deposition, from experts was submitted at the trial. The case resulted in a verdict by the jury sustaining the allegations of the Government's libel.

In the Supreme Court of the District of Columbia two cases of interest are still pending and trials of the same are expected at the fall term of that court. In one of the cases, United States *v.* Seven Cases Buffalo Lithia Water, the court sustained a demurrer to the Government's libel for failure to charge misbranding within the purview of the act. The libel has been amended so as to obtain a determination of the question involved upon its merits, namely, whether an article containing but a trace of lithium and no more than that contained in ordinary water is entitled to be designated as a lithia water.

In the other cases, United States *v.* Five Cases Hurdle Brand Holland Gin, the right of the claimant to label a domestic product as Holland Gin is questioned by the Government. In the last-mentioned case, depositions have been taken both by the Government and claimant throughout the country.

In the case of United States *v.* A. Schmidt, jr., Bros. Wine Co. and A. E. Morphy, a suit for forfeiture of a bond given by the defendants for the release of a product seized pursuant to section 10 of the act and afterwards sold in violation of the food and drugs act and in violation of the conditions of said bond, the court directed a verdict in favor of the Government for the full amount sued for, namely, $1,000, with legal interest from the date of judicial demand June 16, 1908.

Beginning at page 932 of this report will be found tables showing in detail the cases arising under the food and drugs act in which proceedings were begun or terminated during the fiscal year of 1912.

LEGAL WORK FOR THE FOREST SERVICE.

Previous annual reports of this office have contained outlines of the duties of the Solicitor in respect to the legal work of the Forest Service. The present report is a departure from the practice pursued in previous reports, in that it contains a résumé, where the nature of the case will permit, of the legal work performed in each of the six districts under the proper district designation. This departure is necessary to a proper conception of the character and quantity of work performed by the district assistants to the Solicitor. The more important work of the district offices, especially that in which important legal principles are involved and should be determined as a guide for future conduct of the department's business throughout the United States, is always passed upon finally by the Solicitor.

Experience has shown that a considerable volume of what may be called routine legal work is properly left, for reasons of economy and expedition, to final action by the district assistants to the Solicitor. Since the transfer of the legal work of the Forest Service to the Solicitor, by your order, in January, 1910, and the organization of the six district offices of the Solicitor, many of the fundamental principles underlying the legal work of the Forest Service have been presented for consideration and have been carefully worked out, so that uniformity of action in these districts has been established for the conduct of the business of the department relating to the administration of the National Forests. By appreciable overtime work in the six districts it has been found possible to limit the office force to two assistants in districts 1, 2, 3, and 6, and to one assistant in districts 4 and 5, with this exception, that during January of this fiscal year it was found necessary to add a second assistant in district 5.

The work of the office for the Forest Service is divisible into several distinct heads, namely, opinions, contracts, claims, regulations, trespass, general litigation, and hydroelectric power permits. To these divisions has been added another during the present fiscal year, namely, acquisition of lands, under the act of March 1, 1911, for the protection of the navigability of navigable streams, and for this fiscal year there must also be added claims for relief arising out of the forest fires in the Northwest during the fall of 1910, provided for by items in the deficiency appropriation act approved March 4, 1911. These two additions very materially increased the work of the office during the year. Each division of the work is treated under the proper heading in the following pages.

OPINIONS

During the year the office has rendered 93 formal written opinions to the Forester, the district foresters, and the district fiscal agents in respect to questions involving principles requiring considerable research and deliberation for their determination. Of these, 30 were rendered by the district assistants and were reviewed in due course by the Solicitor, and final decision rendered thereon. The district assistants rendered 1,148 informal written opinions to the district foresters and district fiscal agents. Aside from these written opinions, the Solicitor and his district assistants have daily advised the Forester, the district foresters, and district fiscal agents orally in reference to questions arising in the administration of the National Forests, and they have frequently furnished opinions to other departments of the Government relative to questions affecting the two departments jointly. An important item of the work of the district assistants is the comment which they submit to the Solicitor upon formal opinions rendered by each other. In many cases these comments are exhaustive discussions of the questions involved in the opinions under consideration, and they are always useful and valuable to the Solicitor in his final review of the opinions.

The opinions and comments submitted by district assistants during the year are tabulated as follows:

District.	Formal opinions.	Comment on opinions.	Informal opinions.
1	2	21	78
2	1	29	248
3	7	23	346
4	4	20	263
5	9	21	198
6	7	21	75

CONTRACTS.

During the year the Solicitor and his assistants prepared and examined for legal sufficiency upwards of 1,250 contracts for the Forest Service. These contracts included leases, cooperative agreements, bonds, right-of-way stipulations, timber-sale agreements, and agreements for construction of works necessary for the proper administration of the forests. Practically all of the cooperative agreements were with conservation or agricultural departments of the States. Agreements for cooperation in fighting fire on the watersheds of navigable streams, under the act of March 1, 1911, were perfected during the year with the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Maryland, Wisconsin, Minnesota, Oregon, and Washington.

Contracts were prepared in the districts as follows:

District 1	292	District 4	164
District 2	262	District 5	158
District 3	154	District 6	136

CLAIMS.

This office has handled during the year 1,568 cases involving claims to lands within the National Forests under the homestead, timber and stone, mineral, lieu selection, and other special and general land laws of the United States. An explanatory table of these cases is given in a subsequent part of this report, beginning at page 1013. The cases are there divided according to the districts in which they were distributed. This table shows the claimant, character of claim, National Forest in which the land lies, quantity of land involved, and status of the claim on June 30, 1912, the close of the fiscal year. These cases embraced upwards of 400,000 acres of land, supporting many million feet of valuable merchantable timber. Not all of these cases came on for hearing during the year, but each one required some attention, varying in degree with the progress of the case in the Interior Department. In previous annual reports of this office full details of the method and procedure in handling the claims cases were given. Cooperation during the year with the officers and agents of the Department of the Interior has been cordial and productive of splendid results. The office has filed 241 briefs in contested claims cases before the Interior Department, and assistants to the Solicitor have appeared at 186 hearings before the local land offices and clerks of court, where testimony has been taken. Appeals in 21 cases from decisions of the Commissioner of the General Land Office were taken by the Solicitor to the Secretary of the Interior, one motion to dismiss an appeal was made, and five oral arguments before the Secretary of the Interior were made by the office. In the Washington office 980 claims cases were handled during the year. The district assistants handled 1,568 cases. Final action by the Interior Department was taken in 622 cases, of which 462 were decided favorably to the United States and 160 favorably to the claimants. The 462 cases decided favorably to the United States embrace 91,300 acres, supporting upwards of 700,000,000 feet of merchantable timber, valued at upwards of $2,000,000.

Experience has demonstrated the wisdom of the joint orders of the Secretaries of Agriculture and of the Interior of June 25 and November 25, 1910, providing for cooperation between the two departments in the handling of claims cases affecting lands in the National Forests. The assistant to the Solicitor at Portland, Oreg., in District 6, in his report to the Solicitor of the operations of his office for the fiscal year, states that 85 per cent of the claims cases decided during the year resulted favorably to the United States, and he concludes as follows:

> From the decisions rendered during the past year, I am more than ever impressed with the beneficial results which are obtained from the joint orders of the Secretary of the Interior and the Secretary of Agriculture of June 25 and November 25, 1910, under which hearings are conducted and which grant this department all the rights of a private contestant, including the filing of briefs for the consideration of the reviewing officers. I think this in a measure accounts for the increased percentage of cases which have been won during the past two years as compared with previous years.

In addition to briefs filed and hearings attended by the district assistants to the Solicitor, they have taken upward of 75 depositions of witnesses before notaries public and other qualified officers, and the assistant in District 4 cooperated extensively with the chief of field division of the General Land Office in proceedings to revoke the commission of a mineral examiner whose returns in several cases had been found to be irregular. Before final action by the Commissioner of the General Land Office the examiner resigned.

An epitome of the work of the district assistants to the Solicitor in claims cases during the year is shown in the following schedule, by districts:

District.	Cases handled.	Hearings attended.	Briefs filed.	Favorable decisions.	Unfavorable decisions.
1	294	31	31	60	52
2	185	10	6	38	14
3	292	40	30	111	44
4	74	15	11	21	4
5	226	39	32	72	19
6	497	51	65	160	27

REGULATIONS.

The revision of the regulations for the administration of the National Forests which was commenced in the previous fiscal year was prosecuted to completion during the present year, and there was at the close of the year in preparation an appendix to accompany the foregoing regulations to include the principal statutes relating to the administration of the National Forests and such decisions of the courts, the Attorneys General, the Comptroller, and the Solicitor of the department as seem to be essential. From time to time during the year modifications were made in some of the regulations previously promulgated, and a few additional regulations were prepared.

PROCLAMATIONS.

Although not heretofore stated as one of the subdivisions of the legal work for the Forest Service, mention should be made in this report of the work incident to the preparation and examination of proclamations and executive orders for the elimination of lands from the National Forests or for inclusion of additional lands therein. Upward of fifty proclamations and executive orders were either prepared or critically examined during the year preparatory to their submission to the Secretary of the Interior for promulgation by the President; and, in this connection, may be also mentioned five proclamations prepared for the reservation of lands for various bureaus of the department upon which to conduct experiments authorized by appropriations made by Congress. There arose during the year and was pending at its close a contest between the Government and claimants involving a considerable portion of the reservation in Alaska for the Office of Experiment Stations. The department has been and will continue to be represented by this office before the Secretary of the Interior in this contest.

TRESPASS.

The activity of Forest officers in ascertaining and reporting trespasses on the National Forests, which was specially referred to in my last annual report, was not abated during the present fiscal year. Action by this office was required in 406 cases involving trespasses of the following character: 174 grazing, 106 timber, 84 fire, and 42 occupancy. Those of the above trespasses closed during the year resulted in the actual payment by the trespassers of $67,322.54. In addition, several jail sentences followed conviction of defendants in criminal cases. The trespass cases handled during the year will be treated under their separate heads.

GRAZING.—Since the decisions of the Supreme Court of the United States rendered in May, 1911, in the cases entitled United States *v.* Fred Light and United States *v.* Grimaud, Carajaus and Inda (220 U. S., 523; id., 506), setting at rest the authority of the Secretary of Agriculture in the administration of the National Forests, to prohibit the grazing of stock thereon without permit from the department, stockmen have been somewhat more cautious in trespassing upon these lands and much more ready to settle for the trespasses when demand has been made either by the Secretary or through action in the courts. Contentions on the part of the trespassers have shifted from former assertions of the want of authority in the Secretary to prohibit use of the range without permit to disputes, in some cases, over the facts. It is rare, however, that the facts, as reported by the Forest officers, are successfully contested, and it is believed that the time is not far distant when grazing trespasses upon the National Forests will dwindle to those committed through ignorance of boundaries or through inadvertence.

There are four separate and distinct heads under which grazing trespasses are considered by the department. If the trespass is committed through inadvertence, the trespasser is advised that he will be permitted to settle the matter upon payment of the actual value of forage consumed by his stock. If the value of the forage is ascertained not to exceed $100, the district forester is authorized to settle with the trespasser, but if the value of the forage exceeds this amount the report of the Forest officers, together with the recommendations of the district forester and the Forester, are required to be submitted to the Secretary for his ascertainment of the amount due, if any, and for his demand on the trespasser for settlement. If the trespass is not the result of inadvertence, but of willful character, the reports of Forest officers are finally transmitted to the Secretary with a letter prepared by the Solicitor reporting the case to the Attorney General for suit to recover the value of the forage and such punitive damages as seem to be required. If the trespass is committed with flagrant disregard of the rights of the United States and is accompanied by elements of criminality, the facts are reported by the Secretary to the Attorney General with the request for criminal prosecution. The last division of this subject embraces such continuing trespasses as require injunctive process of the courts.

During the year 68 cases were submitted for administrative settlement either by the Secretary or by the district foresters. Of these, 62 were settled by payment to the United States of $3,339.03. There were reported to the Attorney General 65 cases, 30 of which were closed during the year, resulting in the payment of $2,254.70 actual $704.70 punitive damages; and it is worthy of note that, in several cases, punitive damages awarded by the jury greatly exceeded the actual damage. Of these 65 cases, 7 resulted in judgments, not yet settled at the close of the year, for $598.79 actual and $135 punitive damages. Criminal cases reported to the Attorney General numbered 34, resulting in 9 convictions involving 14 defendants, who were fined $873, and one sentenced to jail for three months. In 7 cases defendants now stand indicted; no true bill was returned in 3 cases; defendant was acquitted in 1 case; 5 complaints were dismissed; and the remaining cases were pending for action at the close of the year. The department applied to the Attorney General in 7 cases for action looking to injunctions to restrain continuing trespasses. In 2 of these cases decrees were rendered for the United States, 1 was settled by the trespasser applying to the department for permit, and 4 were pending at the close of the year.

A table of the foregoing cases, giving details relative thereto, will be found in a subsequent part of this report, beginning at page 1062.

An epitome of this table is submitted, according to districts, as follows:

District.	Administrative settlement.	Civil, reported to the Attorney General.	Criminal.	Injunction.
1	5	1		
2	4	9	1	1
3	26	24	11	4
4	18	18	16	
5	12	1	3	
6	3	12	3	

TIMBER.—The office has during the fiscal year handled 106 cases growing out of timber trespasses, 36 of which resulted in the payment into the Treasury of the United States of $23,200.35. Outstanding judgments in 5 cases amount to $3,598.64, which sum will undoubtedly be collected early in the next fiscal year. Of these cases, 31 were settled by the department upon demand for the value of the timber cut, taken, or destroyed, the amount thereof aggregating $4,892.06. In 28 other cases payment was demanded, but had not been made at the close of the year. Of the 37 cases reported to the Attorney General for institution of suit, 5 resulted in recovery upon judgments for the United States of the aggregate sum of $18,308.29, and in 5 judgments for $3,598.64 not yet collected. The Government lost one case and the remaining cases were pending in the courts at the close of the year. The Attorney General was requested to institute 5 criminal cases, one of which resulted in a jail sentence of 20 days. The others were pending at the close of the year. Injunctions to restrain continued cutting of timber were asked in 5 cases, 3 of which resulted in decrees for the Government. The other two were undetermined at the close of the year.

A table giving the details of the foregoing cases will be found in a subsequent part of this report, beginning at page 1066, and there is here appended a résumé of the cases by districts:

District.	Administrative settlement.	Civil, reported to the Attorney General.	Criminal.	Injunction.
1		6		3
2	3	8	2	2
3	26	10		
4	1	10	1	
5	26	7		
6	3	5		

In the last annual report reference was made to the case of G. D. Gorus, a timber trespass on the Bitterroot National Forest in Montana, in which this department recommended to the Attorney General suit on the innocent basis of value of the timber after it was cut at the place where it was cut, this being the rule laid down by the Supreme Court of the United States in the St. Anthony Railroad case. (192 U. S., 524.) The case came on for trial during the present year, and after consideration of the authorities the court instructed the jury to find a verdict for the United States for the value of the timber after it was cut at the place where cut, instead of the stumpage value thereof. Meanwhile, the Department of the Interior continued in force its long-established practice of settling innocent timber trespasses on the public lands on the basis of the stumpage value of the timber. However, in March, 1911, one of the timber cruisers of the General Land Office, attached to the Gainesville Land Office, in Florida, submitted to the Commissioner of the General Land Office a report of an innocent timber trespass committed in Leon County, in that State, in which the stumpage value was given as $2.50 per thousand, and $3 per thousand after felling. The cruiser received from the trespasser a certified check for the value of the timber at the rate of $3 per thousand, and the chief of the field division recommended that the check be accepted in full settlement of the trespass, in accordance with the rule laid down by the Supreme Court of Florida in the case of Peacock et al *v.* Feaster (40 So., 74), which is in full accord with the decision of the Supreme Court of the United States in the St. Anthony case. This recommendation of the chief of field division led to an exhaustive consideration of the matter by the Department of the Interior, and resulted on April 1, 1912, in the complete revision of instructions to the agents of that department in which the measure of damages in innocent timber trespasses is based upon the value of the timber after it is cut at the place where cut. These instructions are found in the case of John W. Henderson (40 L. D., 518), and reference is made therein to the practice of the Department of Agriculture in settling innocent timber trespass cases on the basis of valuation after the timber is felled.

There were pending in the courts at the close of the year 2 cases involving the question of title to lands embraced in school sections in the States of Oregon and Washington, which sections were included in National Forests prior to survey. In one of these cases, which is typical, timber was cut by the holder of a deed from the State to the land. This department requested the Attorney General to institute suit for an injunction to restrain the cutting. In this case the respective rights of the United States and the State of Washington will undoubtedly be determined, and with this determination will probably end an issue which is of much importance in the administration of the National Forests.

FIRE.—None of the trespasses on the National Forests is more destructive to their maintenance for the objects intended than fire trespasses. Many of these occur through the negligence and carelessness of parties occupying, or temporarily sojourning on, National Forest lands or privately owned lands adjoining the National Forests, and it is a deplorable fact that in a few cases fires have been maliciously set. The watchfulness of Forest officers during the year has resulted in the suppression of many fires in their early stages and in the apprehension of many persons responsible therefor.

During the year 84 fire-trespass cases were handled by this office, 54 of which resulted in the payment by the trespassers of $36,665.11. Settlement was made by the department in 4 cases; judgments were procured in 5; in 1, judgment was rendered for defendant; 13 convictions were secured in Federal courts, resulting in fines amounting to $735; and in 2, jail sentences of 3 months each. One of the fines amounted to $500. In 37 cases prosecutions were instituted in State courts under State laws, and 32 convictions were secured resulting in fines aggregating $1,385, and 5 defendants were committed to jail. It is interesting to note that in these cases prosecuted in State courts, 3 defendants were convicted for refusing to lend assistance in fighting forest fires. In explanation of prosecutions in the State courts under State laws it only need be said that this course is resorted to by the district assistants to the Solicitor whenever more expeditious action can be attained, and the practice is fully justified by the remarkable success the department has had in these cases.

A table, giving the details of the foregoing cases, is inserted in a subsequent part of this report, beginning at page 1070, and there is appended a résumé of the cases by districts:

District.	Administrative settlement.	Civil, reported to Attorney General.	Criminal, reported to Attorney General.	Criminal, State courts.
1		3		
2	1	7	2	
3			7	
4		2	1	
5	4		8	36
6	1	2	9	1

OCCUPANCY.—The designation "Occupancy trespasses," as used in this report, includes the illegal use of unperfected mining claims for conduct of saloons thereon; possession of land under claim of right adverse to the United States; possession of land for water-power development without permit from this department; acquirement of patent to land through illegal means; and unlawful inclosure of lands.

The office handled 42 occupancy trespasses during the fiscal year, 3 of which were settled administratively by the receipt of $75.65, representing the damage to the Government, and by the application of one of the trespassers for a permit to cover the land inclosed by him. Thirty-one cases were reported to the Attorney General, in two of which decrees enjoining defendants from further continuance of the trespasses were secured. Criminal prosecutions were had in 7 cases, in 4 of which defendants were fined in the aggregate $210, and 2 of them sentenced to jail in addition to their fines. Only 1 defendant was acquitted. All the other cases were pending at the close of the year. Two defendants were convicted in the District of Idaho for the maintenance of saloons on unperfected mining claims, 1 being fined $150 and sentenced to 60 days in jail, and the other sentenced for the same term but without the fine. Another defendant was convicted in Arizona for a similar offense and fined $50. The saloon cases pending in Nevada at the close of the last fiscal year were abated during this fiscal year by the elimination of the lands from the National Forest. One defendant was convicted in the Western District of Washington for the construction of a flume upon the Okanogan National Forest without permit from the department and was fined $10 and made to pay the costs of the suit, amounting to $362.21. During the year 11 cases were handled involving the construction upon National Forests, without permit, of water-power works. None of these cases was concluded during the year, but considerable work was done in connection with them by the district assistants to the Solicitor toward the preparation of the pleadings to be filed on behalf of the United States. The Hydro-Electric Power case, which was referred to at length in the report of this office for the last fiscal year, proceeded during the present year to the submission of the case to the court on the voluminous testimony taken, and there is every indication that the Government will sustain its position in the case.

In the spring of 1911 a bill was introduced in the House of Representatives to grant the Hydro-Electric Co. a right of way over the lands in the Mono Forest involved in the litigation. One of the assistants in this office appeared before the Public Lands Committee of the House and presented the department's view of the litigation and of the inexpediency of granting the right of way. The bill was subsequently reported favorably to the House, but when put upon its passage was defeated by a very large vote.

The office handled during the year 7 cases involving the procurement of patent to lands illegally. One of these cases is really divisible into 97 separate suits, all of which were pending, on the answer of defendants, at the close of the year.

A table giving the details of the foregoing cases is inserted in a subsequent part of this report, beginning at page 1073, and there is appended a résumé of the cases by districts:

District.	Administrative settlement.	Civil, reported to Attorney General.	Criminal.
1			2
2	1	9	
3		2	2
4		4	2
5	3	14	
6		2	

GENERAL LITIGATION.

Under this heading fall all those cases which are not embraced within the general designation "Trespass." A very important case arose during the year in the county court, Clear Creek County, Colo., involving the validity and effect of a special-use permit granted by this department covering a small tract of land in the Pike National Forest, which was subsequently, and while occupied by the permittee, located by certain parties under the mining laws. These parties brought suit against the department's permittee to eject him from the premises. This department requested the Attorney General to intervene in the case, since it involved the validity of a permit granted by the department. The United States attorney was so instructed, and the district assistant to the Solicitor cooperated with him in the preparation of an exhaustive brief in behalf of the Government. The court sustained the permit as superior to any rights acquired by the mining locators subsequent to its issuance.

Another case of special interest is one instituted at the request of this department to restrain a company from closing a road in the Rio Grande National Forest, which is used in the administration of that Forest and especially in connection with the removal of timber which has no other convenient outlet. The case was at issue at the close of the year. Also of interest may be mentioned the conviction of two defendants for dynamiting fish in the Routt National Forest. These prosecutions were initiated by the Forest Service and the trials attended and participated in by the assistant to the Solicitor in district 1. One of the defendants was sentenced to 2 years in the State reformatory and the other to 15 months in the penitentiary.

In the case against Forest officers on the Alamo National Forest, N. Mex., who were indicted in the Territorial court during the last fiscal year for removing trespassing cattle from the Forest, the demurrer to the indictment was sustained and the defendants discharged. One indictment was returned for forgery of a check issued by the district fiscal agent at Denver, Colo., and another case involving a similar forgery was reported to the Attorney General, but no action had been taken in the court at the close of the year. In two cases parties were indicted for perjury in testifying in cases of claims to lands lying within the Coeur d'Alene National Forest. Demurrers to the indictments were argued during the year, but the court has not yet rendered decision thereon.

During the year the assistants to the Solicitor at Missoula, Mont., in District 1, cooperated with the United States attorney for the District of Idaho in the taking of voluminous testimony in the case of United States *v.* Chicago, Milwaukee & St. Paul Railway Co. It will be remembered that this case involves the power of the Secretary of Agriculture to require a railroad company to file stipulations for protection of National Forests over which a company proposes to construct a railroad during the temporary withdrawal of lands by the President for forest purposes and pending final proclamation creating a National Forest. In this case the general counsel of the company entered into a written agreement with the Forester binding the company to file such stipulations as the Secretary might require as a prerequisite to the consent of the Secretary to the construction by the company of a railroad over the Coeur d'Alene National Forest. The company completed its road over the Forest and refused to execute and file the stipulations. This suit is brought by the United States primarily to enforce specific performance of the agreement to file the stipulations. In addition to the taking of testimony during the year, some of which was taken in Washington, D. C., by this office, the assistant at Missoula prepared an exhaustive brief on the issues involved in the case. The brief will be filed for the consideration of the court.

Near the close of the year the department requested the Attorney General to take the necessary action to remove into the District Court for the Northern District of California from the State court in Tuolumne County, Cal., an action instituted against the supervisor of the Stanislaus National Forest to restrain him from enforcing the laws of the United States on a tract of land in the Forest claimed by the complainant under a deed from the State of California executed on the theory that the land belonged to the State under the swamp-land grant of Congress. The assistant to the Solicitor in district 5 cooperated with the United States attorney in the preparation of the necessary pleadings to effect the removal.

A table, showing the important details of the cases handled during the year under this heading is set out in a subsequent part of this report, beginning at page 1075, and the cases are there distributed and designated according to the several districts in which they arose and are pending.

COOPERATION WITH UNITED STATES ATTORNEYS.

During the fiscal year cooperation between United States attorneys, to whom were referred litigation of this department arising out of the administration of the National Forests, and the district assistants to the Solicitor, has been extensive, uniformly cordial, and productive of substantial results. This opportunity should be taken to express the appreciation of the department of the careful attention the United States attorneys have given the business of the department. It is impossible in a report of this character to set forth anything like a complete statement of the work of the district assistants to the Solicitor in their cooperation with the United States attorneys. They have been in practically daily communication with the United States attorneys and have prepared pleadings in many of the cases instituted and prosecuted during the year. They have prepared numerous briefs to be used on arguments, either in the trial or in the appellate courts, and have orally argued, in part at least, a number of vigorously contested cases. In district 4 the assistant to the Solicitor preserved a record of 36 complaints and indictments drawn by him at the request of the United States attorneys.

HYDROELECTRIC POWER PERMITS.

During the year there were submitted to the Solicitor for examination 56 applications for permits under the act of February 15, 1901, which provides that the Secretary of Agriculture, in his discretion, may allow the use of rights of way in the National Forests for the generation and utilization of hydroelectric power. A careful scrutiny of all these applications has been made by this office and reports submitted to the Secretary thereon. In addition to these, 24 outstanding permits were revoked by formal instruments submitted to the Solicitor for approval, and similar reports were made thereon to the Secretary. Examination was made of three instruments for the extension of time within which to construct works under the terms of previous permits. Two contests between opposing applicants for rights of way over the same lands were orally argued during the year before the Solicitor and full report made to the Secretary thereon.

DECISIONS OF THE COURTS AND ATTORNEY GENERAL.

No judicial decisions affecting fundamental principles of National Forest administration were rendered during the year. Such of the minor questions as have been judicially determined are heretofore referred to under the heading "Trespass." The decision of the Circuit Court for the District of Colorado, rendered August 29, 1911, and reported as United States *v.* Denver & R. G. R. Company et al. (190 Fed., 825), while not arising out of any prosecution connected with the administration of the National Forests, is nevertheless of controlling importance in the timber-sale business of the Forest Service, as well also as in the administration of the right-of-way laws. In this case the court held that—

> Under a grant to a railroad company of the right to take timber from public lands adjacent "required for the construction and repair of its railway and telegraph line," any part of the timber cut which was not suitable for such use, and all waste or side cuts incident to the sawing of the logs used into the dimensions required, remains the property of the United States, and the company has no right therein, and, if used by it for other purposes or by its agents for their own benefit with its consent or to its profit, the company and such agents are jointly liable therefor.

The agricultural appropriation act for the fiscal year 1912, approved March 4, 1911, contains a provision authorizing and empowering the head of the department having jurisdiction over the lands, under general regulations to be fixed by him, to grant an easement for rights of way for a period not exceeding 50 years over and across public lands, National Forests, and reservations of the United States for electrical poles and lines for the transmission and distribution of electrical power and for poles and lines for telephone and telegraph purposes. A proviso in the act permits the grant of an easement over reservations of the United States only when approved by the chief officer of the department under whose supervision or control such reservation falls, upon a finding by him that the grant will be compatible with public interests. As this provision of the act required the promulgation of regulations for its administration, the department, early after the passage of the act, suggested to the Secretary of the Interior that a conference be had between the two departments to the end that uniformity as near as possible might be secured in the regulations of the two departments governing the easements over public lands and National Forests. In response to this suggestion, the Secretary of the Interior expressed the opinion that the act conferred upon him exclusive authority to grant the easements therein provided for in the case of the National Forests as well as of the unreserved public lands. This department did not so construe the act, and, being of the opinion that it imposed upon the Secretary of Agriculture the duty of granting rights of way over the National Forests, requested reconsideration by the Secretary of the Interior, suggesting that, if he was still of the opinion formerly expressed, the matter be submitted to the Attorney General for an opinion. It was so submitted to the Attorney General upon exhaustive briefs filed by both departments, the one for this department having been prepared by the Solicitor, and on February 3, 1912, the Attorney General, in an opinion to both of the departments, held that the act conferred sole authority upon the Secretary of Agriculture to administer the act so far as it applies to National Forests.

In consequence of the extensive forest fires in the fall of 1910 large bodies of timber were reduced to the condition of what is commonly called fire-killed timber. This timber is merchantable if cut within two or three years, but after that period is practically valueless. Much of the timber injured by the fires was situated upon lands within the boundaries of National Forests, but upon unsurveyed or unclassified sections which were within the primary limits of grants to railroad companies, or embraced within unapproved railroad selections or claims initiated and subsisting under the homestead laws. The early sale of this fire-killed timber was recognized as imperative, both by the department and by the claimants of the lands. The department was of the opinion that no authority existed in the claimants of the lands to sell the timber and that the authority of the Secretary of Agriculture to sell the timber standing on the claims was very doubtful. In this view of the case the department submitted to the Attorney General a plan which it was conceived would conserve the value of the timber and at the same time protect the contingent interests of the United States therein. By this plan it was proposed that purchasers of the timber should make an arrangement with the claimants to the lands looking to the removal of the timber and file with the department a bond securing the United States for the value of the timber in the event the claims to the lands should subsequently be canceled, abandoned, or relinquished, or decided by proper authority not to belong to the claimants. In response to this suggested plan, the Attorney General, on November 23, 1911, advised the department that it might be legally put into operation, since the Government had sufficient interest in every unperfected claim to authorize the proper executive officer of the Government to take action looking to the protection of the interests of the United States.

CLAIMS FOR RELIEF.

In recognition of services rendered in the suppression of the unusual and destructive forest fires of the summer and fall of 1910, Congress, in the act of March 4, 1911, making appropriations for deficiencies in the appropriations for the fiscal year 1911, appropriated $15,000 to enable the Secretary of Agriculture to pay all necessary expenses involved in the interment of the bodies of men who were killed while in the employment of the department fighting forest fires in the National Forests prior to December 1, 1910, and to grant relief to their dependent relatives, and to pay for hospital services and medical attendance for the injured men. An additional sum of $5,450 was included in this act to enable the Secretary to reimburse temporary employees of the Forest Service for the value of time lost from their usual employment by reason of injuries sustained while fighting fires, and a further sum of $2,742.90 for reimbursement of the owners for the value of horses and equipment destroyed while being used by the Government in fighting those fires.

In order that these appropriations should be properly disbursed by the department, it was essential that the validity of claims upon the appropriation should be established by proper and satisfactory evidence. To this end the Solicitor early in the year prepared a set of forms to be used in the proof of claims under the several appropriations. In addition to this, numerous questions arose as to the application of the appropriations to cases not plainly within its provisions. A number of opinions were rendered the Forester relative to these questions. When the evidence required for the establishment of a claim was assembled and the recommendation of the Forester submitted to the Secretary, the papers were referred to the Solicitor for review and examination, both as to the sufficiency of the evidence to establish the claim and as to the application of the appropriation to each cause. During the year 123 claims were referred to the Solicitor for action. Of these, 16 were claims for payment of burial expenses; 19 for payment of hospital expenses and medical attendance; 39 for reimbursement of temporary employees for value of time lost; 23 for reimbursement of owners of horses and equipment destroyed; and 26 for relief of dependent relatives of men killed in the fires.

While these claims were pending in the respective district branches of the Forest Service awaiting approval and recommendation of the district foresters, the assistants to the Solicitor examined each claim, and wherever evidence was deemed insufficient, the district foresters were advised to procure additional evidence necessary to entitle the claim to favorable consideration. The bulk of these claims originated in District 1, and the assistant to the Solicitor in that district handled 88.

ACQUISITION OF LAND FOR PROTECTION OF NAVIGABLE STREAMS.

On March 1, 1911, the President approved an act to enable the States to cooperate with each other, or with the United States, for the protection of the watersheds of navigable streams and to create a commission for the acquisition of lands for the purpose of conserving the navigability of navigable rivers. This act is familiarly referred to as the "Weeks forestry law" in recognition of the author of the bill. Section 3 of the act appropriated $1,000,000 for the fiscal year 1910 and $2,000,000 for each fiscal year thereafter, until June 30, 1915, for use in the examination, survey, and acquirement of lands located on the headwaters of navigable streams, or those which may be developed for navigation. Section 4 of the act provided for the appointment of a commission, to be known as the National Forest Reservation Commission, to pass upon such lands as may be recommended for purchase by the Secretary of Agriculture. Section 7 authorized the Secretary of Agriculture to purchase for the United States such lands as the commission might approve for purchase and at the prices fixed by the commission, and it was provided that no deed or other instrument of conveyance shall be accepted or approved by the Secretary until the legislature of the State in which the land lies shall have consented to the acquisition of the land for the purposes expressed in the act. Section 8 authorized the Secretary of Agriculture to do all things necessary to secure safe title in the United States to the lands to be acquired under the act, but provided that no payment shall be made for the lands until the title shall be satisfactory to the Attorney General and shall be vested in the United States.

Early in the year the Solicitor made a careful examination of the laws of all the States in which it was proposed to purchase lands under the act in order to ascertain whether or not the States had consented to the acquisition by the United States of lands for the purposes expressed in the act.

During the last fiscal year one contract was entered into for the conveyance to the United States of a tract of 32,000 acres of land in northern Georgia. This contract devolved upon the department the necessity of an examination and verification of the abstracts of title to the lands, and during the early part of the fiscal year an attorney familiar with records and the conditions of title in northern Georgia was temporarily employed and attached to the office of the Solicitor for service in the examination of the records and abstracts of title to these lands. Meanwhile, the National Forest Reservation Commission was passing upon and authorizing the purchase of additional tracts of land in Tennessee, North Carolina, and Virginia, and it was early foreseen that the department would be required to place in the field a sufficient force of trained experts to make the requisite examination of abstracts and records of title to the lands. Accordingly, the Civil Service Commission was requested to hold an examination for the purpose of establishing an eligible list of men for employment in this office in connection with the title work under the act. The examination was held in the fall and selections from those qualified by the examination have been made from time to time during the year as the necessity of the work required. All the contracts for the purchase of lands under the act are prepared by the Solicitor from information furnished by the Forester, and after execution by the vendors and the Secretary, copies are sent to the United States attorneys for recording in the counties where the land lies, and the record examiners are furnished with a copy, together with the abstract required to be furnished by the vendors. With these abstracts the record examiners make a careful search and examination of the records in the several counties where the lands lie, and they secure such evidence de hors the record as may be necessary to establish the various links in the chain of title. When they have concluded their investigation of the lands embraced in each contract, they make their report of the result of the investigation and of their opinions upon the evidence, to the United States attorneys, who, in due course, transmit all the papers to the Attorney General for final determination of the validity of the title to the land.

During the fiscal year the National Forest Reservation Commission authorized the purchase of 39 tracts of land of an aggregate area of 287,000 acres in the States of Georgia, Tennessee, North Carolina, Virginia, and New Hampshire. The contracts covering the lands so authorized to be purchased were prepared by the Solicitor. No lands had yet been purchased at the close of the fiscal year, but most of the work necessary to procure title to the tract in northern Georgia, above referred to, and another in Tennessee, had been performed, and it is very probable that title to these lands will vest in the United States early in the succeeding fiscal year. The title of the vendors to the tract in northern Georgia having been found by the Attorney General to be defective and insufficient to vest safe title from them in the United States, it was necessary to begin condemnation proceedings, which had proceeded at the close of the fiscal year to the taking of testimony upon the values of the lands.

THE TWENTY-EIGHT HOUR LAW.

ENFORCEMENT OF THE ACT.

During the fiscal year 1912 the enforcement of the twenty-eight hour law (act of June 29, 1906, 34 Stat., 607), proceeded vigorously and effectively. The department reported to the Attorney General 631 instances of apparent violations of the statute in that period. This is 33 more cases than were reported in the fiscal year 1911, 598 cases having been transmitted to the Attorney General in that fiscal year. The reports of the department inspectors fail to show determined efforts on the part of common carriers in general to obey the law. Of the 631 cases reported, together with those coming over from the fiscal year 1911, there were 967 cases pending at the close of June 30, 1912. Penalties were recovered in 357 cases and 98 cases were dismissed. In the preceding fiscal year, of the 598 cases reported, together with those coming over from the preceding fiscal year, penalties were assessed in 254 cases and 66 cases were dismissed. At the close of that year 807 cases were pending. In the fiscal year 1911, 30 cases were lost, or about 8 per cent of the total number; in the fiscal year 1912, 16 cases were lost, or a trifle over 3 per cent of the total. In 1911 penalties in the sum of $26,075 were recovered and costs in the sum of $5,783.85 were paid; in 1912 penalties in the sum of $28,400 were recovered and costs in the sum of $2,937.13 were paid. In short, there were 33 more cases reported in 1912 than in 1911, $2,325 more in penalties and $2,847.72 less in costs collected in 1912 than in 1911, and there were 160 more cases pending on June 30, 1912, than on June 30, 1911.

The enforcement of the twenty-eight hour law has undoubtedly resulted in the more humane treatment of cattle in the course of transportation. There are in use in the country a considerable number of so-called "feed and water" cars, in which animals are fed and watered and have opportunity to rest. Some of the railroad companies have improved the conditions of the yards into which animals are unloaded for food, water, and rest, and maintain yards at convenient distances to enable compliance with the law. The number of violations discovered by inspectors of the Bureau of Animal Industry each year shows that much remains to be accomplished. Experience shows that the recovery of minimum penalties of $100 does not operate as an effective deterrent against new violations. This office has uniformly declined to acquiesce in the settlement of cases on this basis, and has recommended that the facts in the cases be stated to the courts, leaving it to the courts to fix the penalties, or that insistence be made for the assessment of the maximum penalty of $500. Compliance with the law will be more readily secured, it is believed, by the exaction for violations of penalties which will make the transportation of stock in violation of the law unprofitable to the carrier. Attention has been called in previous reports of this office to the need for the enactment of a law regulating the minimum speed of trains carrying live stock. None of the bills introduced in Congress for this purpose have been enacted into law. Such a measure would contribute much to the humane treatment of live stock in transit and at the same time further the interests of the shipper.

DECISIONS OF THE COURTS.

During the fiscal year 1912 the following important decisions of the Federal courts were handed down in cases arising under the twenty-eight hour law:

GRAND TRUNK RAILWAY CO. v. UNITED STATES.

(191 Fed., 803; Circular No. 59, Office of Solicitor.)

A decision in favor of the Government was rendered in the lower court, holding that the twenty-eight hour law is applicable to a shipment originating in one State and passing through a foreign country into another State. The railroad company appealed on the grounds that no violation of the provisions of the act on the part of the defendant occurred while the cattle were in transportation through Canada and that the twenty-eight-hour law is not applicable to a shipment originating in one State and ending in another which, in the course of transportation, passes through a foreign country. The court of appeals affirmed the decision of the lower court.

UNITED STATES v. NEW YORK CENTRAL & HUDSON RIVER R. R. CO.

(191 Fed., 938; Circular No. 60, Office of Solicitor.)

The only question involved in this case was as to what constitutes proper space and opportunity to rest in the cars for cattle. It was held that when the cars are not unloaded all the animals contained therein must have sufficient space for lying down at the same time. The court, in rendering this decision, followed the case of United States *v.* New York Central & Hudson River Railroad Co., reported in 186 Fed., 541, which held that when cattle are transported in interstate commerce each animal should be allowed at least 2½ feet of space in the cars in which to rest.

UNITED STATES v. ERIE R. R. CO.

(191 Fed., 941; Circular No. 61, Office of Solicitor.)

The same question was presented in this case as in the one last mentioned, namely, what constitutes proper space and opportunity to rest in the cars for cattle, and the court held the same way as in that case.

UNITED STATES v. NEW YORK CENTRAL & HUDSON RIVER R. R. CO.

(Circular No. 62, Office of Solicitor; not reported in the Federal Reporter.)

This decision involved 11 actions. The court held that a judgment recovered from a preceding carrier for violation of the twenty-eight-hour law is not a bar to a subsequent action against the connecting carrier, which, presumably, had knowledge of the length of time animals had been confined without rest, water, and food, and the defendant is not relieved from complying with the statute on the ground that the preceding carrier first violated its provisions and paid the penalty provided by the statute, even though a new period equal to the statutory time had not expired. The court followed United States *v.* New York Central & Hudson River Railroad Co. (156 Fed., 249), and United States *v.* Lehigh Valley R. R. Co. (184 Fed., 871; affirmed in 187 Fed., 1006). It was held, further, that a connecting carrier is bound, as a matter of law, to make reasonable inquiry of the preceding carriers as to the time the transportation began and whether the statute was complied with in transit. The court also held that the words "knowingly" and "willfully" do not imply a wanton or malicious purpose, but a failure to exercise diligence by the receiving carriers in unloading for rest, feed, and water after receiving the live stock and having reason to know that the animals had not been rested or given food and water within the time specified in the act.

Chicago, Burlington & Quincy R. R. Co. v. United States.

(194 Fed., 342; Circular No. 63, Office of Solicitor.)

This case involved a shipment of 17 carloads of sheep. The train was delayed about two hours by the breaking of a drawbar and chain of a train which met and passed it, by the slipping of a knuckle in the coupler which separated it into two parts, and by the pulling out of two drawbars in its cars, which made it necessary to draw the two parts of the train upon a side track and recouple them. Upon its arrival at the stockyards the company dragged the sheep out of two of the cars in the dark within the 36 hours, but left the unloading of 15 of the cars until the next morning, after the expiration of the 36 hours. The carrier maintained that it did not knowingly and willfully violate the law and that it was prevented from complying with it by accidental or unavoidable causes which could not be anticipated or avoided by the exercise of due diligence and foresight. The court below instructed the jury to return a verdict for the Government, and the railroad company appealed. The court of appeals in reversing the decision of the lower court held that there was no substantial evidence that the company willfully violated the law and that there was substantial evidence that it was prevented from unloading the sheep within the 36 hours by accidental or unavoidable causes which could not be anticipated or avoided by the exercise of due diligence and foresight.

Chicago, Burlington & Quincy R. R. Co. v. United States.

(195 Fed., 241; Circular No. 64, Office of Solicitor.)

This is the case which was won by the Government in the lower court (see Circular No. 42, Office of Solicitor) and referred to in the preceding annual report. The lower court held that it is not enough to show that animals "can" have food and water, but that it must be shown that the animals "do" have proper food, water, space, and opportunity to rest in the cars, boats, or other vessels where carried. The railroad appealed from this decision on the ground that it is essential to the recovery of the penalty that proof be made that the defendant knew that the animals did not have proper food, water, or space to rest in the cars which carried them. In affirming the decision of the lower court it was held that this is not essential and that the offense consists in knowingly and willfully confining animals that lack proper food, water, space, and opportunity to rest in the cars which transported them.

United States v. Atchison, Topeka & Santa Fe Ry. Co.

(185 Fed. Rep., 105.)

The only question presented in this case is the proper construction of the last proviso of section 1 of the act, relative to the limitation of 36 hours in the case of sheep. The lower court gave judgment for the railroad, holding that where the 36-hour period expires in the nighttime the sheep need not be unloaded until daylight. The court of appeals reversed this decision, and held that the period of time referred to in section 1 as expiring in the nighttime has reference only to the 28-hour period and not to the extended period of 36 hours; in other words, that sheep must be unloaded at the end of 36 hours, even in the nighttime.

ST. JOSEPH STOCKYARDS CO. v. UNITED STATES.

(187 Fed. Rep., 104.)

This case involves three actions. The stockyards company accepted cattle which had been confined beyond 28 hours in two cases and less than 28 hours in the third. It then transported the stock to its yards for rest, food, and water within 2 hours and 30 minutes after it received them. It had no actual knowledge of the length of previous confinement and made no effort to find out. The court below rendered judgments for the Government, but the court of appeals for the eighth circuit, in reversing the lower court, held that the stockyards company, in transporting the stock to its yards and providing them with rest, food, and water, obeyed the spirit and accomplished the end of the 28-hour law. It further held that the stockyards company did not "knowingly" or "willfully" confine the cattle in violation of the statute. In deciding this case the court followed its decision in the case of United States *v.* Stockyards Terminal Ry. Co. (178 Fed., 19, 23). The interpretation placed in this case on the meaning of the words "knowingly" and "willfully" is at variance with decisions in other circuits. It is essential that the questions should be finally passed upon by the Supreme Court, and cases are in the course of prosecution in this circuit with this end in view.

The case of United States *v.* St. Louis National Stock Yards Co., involving the liability of a terminal company in general under the act, which was set for trial before the Supreme Court of the United States on October 10, 1911, was dismissed on motion of counsel for the Government on account of the unsatisfactory state of the record. A new suit was instituted, however, against this same company on March 15, 1912, for the purpose of testing this question, and the case had not been brought to trial at the close of the fiscal year.

An encouraging feature of the work incident to the enforcement of this humane statute was the assessment of the maximum penalty in a considerable number of cases. Experience has shown that the imposition of minimum penalties is not an effective deterrent against repetition of violations, but it is believed that increased penalties will produce beneficial results by decreasing the profits of carriers who may continue to disregard the prohibitions of the law. In 1911 the maximum fine of $500 was assessed in 3 cases, $350 in 1, $300 in 5, $250 in 6, $200 in 17, $150 in 11, and $125 in 1 case; $100 was assessed in the rest. In 1912 the maximum penalty of $500 was assessed in 12 cases, $200 in 17, and $250 in 2 cases; $100 was assessed in the remaining cases. The record of penalties is particularly noteworthy because, owing to the decision of the Supreme Court in Baltimore & Ohio Southwestern R. R. Co. *v.* United States, a number of cases had to be consolidated on which separate penalties would otherwise have probably been secured.

At page 989 of this report will be found a table setting forth the details of cases arising under the 28-hour law, and finally disposed of during the period covered by this report.

ACTS REGULATING THE INTERSTATE MOVEMENT OF LIVE STOCK FROM QUARANTINED DISTRICTS AND PROHIBITING THE INTERSTATE MOVEMENT OF DISEASED LIVE STOCK.

Under this heading is comprehended the work of the examination and collation of evidence and reporting apparent violations of the provisions of sections 2 and 4 of the act of March 3, 1905 (33 Stat., 1264), prohibiting the interstate movement of cattle or other live stock from States or Territories or portions thereof quarantined by the Secretary of Agriculture under the act, for contagious, infectious, or communicable diseases among live stock, except under rules and regulations prescribed by the Secretary of Agriculture under the act, and of section 6 of the act of May 29, 1884 (23 Stat., 31), prohibiting the interstate movement of live stock affected with any contagious, infectious, or communicable disease among live stock.

During the fiscal year ended June 30, 1912, 124 apparent violations of the act of March 3, 1905, and 11 apparent violations of the act of May 29, 1884, were examined and reported to the Attorney General, an increase of 34 under the act of March 3, 1905, and one under the act of May 29, 1884, reported during the preceding fiscal year, and this notwithstanding the scope of the former act was considerably restricted as an effect of a decision of the Supreme Court, more particularly referred to below.

Cases charging 67 violations of the act of March 3, 1905, and 6 violations of the act of May 29, 1884, were determined favorably to the Government in the course of the fiscal year, for the most part by pleas of guilty. Fines aggregating $5,600 as a result of these convictions in cases under the act of March 3, 1905, and $925 in those under the act of May 29, 1884, were assessed. These sums are exclusive of costs which were a material addition to the penalties. In two convictions under the act of May 29, 1884, the defendant was sentenced to a fine of $300 and imprisonment of 9 months in one case, and in the other the defendant was sentenced to imprisonment for 30 days in addition to a fine. In some six of the above convictions sentence was suspended by the court on payment of costs.

Verdicts of not guilty were returned on the trials of cases involving four alleged violations of the act of March 3, 1905, and one of the act of May 29, 1884; while grand juries failed to return indictments on presentations of seven alleged violations of the former act and one of the latter act.

Suits were begun during the fiscal year and were still pending in the courts at its close in cases including 62 violations of the act of March 3, 1905, and 4 violations of the act of May 29, 1884.

Proceedings were dismissed during the fiscal year in five cases under the act of March 3, 1905, for various and special reasons. Proceedings were also withheld or discontinued in some 150 alleged violations of the act of March 3, 1905, reported for prosecution in the course of the three preceding fiscal years, and referred to the United States attorneys for the Eastern District of Illinois and the Eastern District of Missouri, against the Terminal Railroad Association of St. Louis, the St. Louis Merchants Bridge Terminal Railroad, and the St. Louis National Stock Yards, pursuant to a decision of the United States Supreme Court rendered in October, 1911.

In this case an indictment had been returned against the Baltimore & Ohio Southwestern Railroad Co. in the Southern District of Ohio charging violations of section 2 of the act of March 3, 1905 (see cases Nos. 281, 282, and 288 in the appended table), in receiving in the State of Ohio from connecting railroads and transporting, without compliance with the regulations made under the act, shipments of sheep originating in the State of Kentucky, quarantined under the act for scabies in sheep. The indictment was quashed by the court on its own motion holding that the defendant railroad company could not be held to answer the charge, because the indictment showed that although the shipment originated in the quarantined area the defendant had not received the shipments of sheep in question in a quarantined State or transported them from a quarantined State, but had received and transported the sheep through places, wholly without the quarantined State of Kentucky. Exception was thereupon taken by the United States attorney to the ruling and judgment of the court and the case was taken to the United States Supreme Court on writ of error. The case was argued and decided at the October term, 1911, and the judgment of the district court was affirmed.

The same question was raised as early as December, 1909, in the case under the act of March 3, 1905, of the United States *v.* St. Louis Merchants Bridge Terminal Ry. (188 Fed., 191); United States *v.* El Paso & Northeastern R. R. (178 Fed., 846); United States *v.* Chicago, Burlington & Quincy R. R. (181 Fed., 882); and United States *v.* Southern Railway Co. (187 Fed., 209). In the first three of which cases the same construction was given to the statute as was subsequently given in the decision of the Supreme Court, while in the last case mentioned a contrary ruling was made.

Of the cases under the act of March 3, 1905, pending or determined in the courts during the fiscal year ending June 30, 1911, 107 were reported to the Attorney General in the course of the year, while 196, including the large number above mentioned as dismissed pursuant to the decision of the Supreme Court, had been reported to the Attorney General during previous fiscal years.

The status or disposition of proceedings in cases under the act of March 3, 1905, and the act of May 29, 1884, is indicated in detail in the tables on page 994.

In a number of instances alleged violations of the acts of March 3, 1905, and May 29, 1884, referred to the Solicitor by the Bureau of Animal Industry, have been returned with requests for further investigation or evidence, and in a few instances with the opinion that no prosecution could be instituted.

Several orders of the Secretary of Agriculture establishing or changing quarantines under section 1 of the act of March 3, 1905, were examined in the course of the fiscal year as to their legal form and sufficiency.

THE MEAT-INSPECTION AMENDMENT.

During the fiscal year 1912 there were reported to the Attorney General 85 violations of the meat-inspection amendment of June 30, 1906 (34 Stat., 674), while during the fiscal year 1911, 101 such violations were similarly reported, making a decrease of 16 violations in 1912. Of the 85 cases reported during the year, together with those coming over from previous years, 65 resulted in convictions, 9 were dismissed for various reasons, in 10 cases the grand jury failed to return indictments, in 4 cases verdicts were rendered for the defendant. In 3 cases sentences of imprisonment were also imposed in addition to a fine, in one amounting to 20 days, in another to 1 year, and in the third to 6 months. At the close of the year 71 cases were pending. The total fines assessed during the year amounted to $4,746.75, as compared with $3,240 in fines assessed in 1911. At page 1005 of the report will be found a table setting forth the details of cases arising under the meat-inspection amendment.

There was a marked tendency by the courts to impose sentences of unusual severity during the year. For example, in the case against Schwarzchild & Sulzberger Co. (case No. 97) for the shipment of unsound and unwholesome sausage from New York to Pennsylvania a plea of guilty was entered and the court imposed a fine of $300; in the case against William Riley (case No. 164) for the shipment from New York through the State of New Jersey into the State of New York of immature veal carcasses, the defendant was sentenced to pay a fine of $500 and to be imprisoned for a term of one year. In the case against Charles S. Gotschall (case No. 189), which was brought for the transportation of uninspected veal from West Virginia into Ohio, the defendant, after a plea of guilty, was sentenced to pay a fine of $1,000 and costs. The execution of the sentence, however, was suspended upon condition of good behavior. A fine of $250, with a six-months' jail sentence, was imposed against Joseph D. Schultz (case No. 218) for the shipment of immature veal carcasses from New York through New Jersey into New York. In another case (case No. 246), against L. L. Teeple, for offering the meat from a tuberculous cow for shipment from New York through New Jersey to New York, a fine of $200 was imposed. On the whole it may be stated that the tendency of the courts during the past year has been to assess heavy penalties for violations of this law.

A question of vital importance in the administration of the meat-inspection law was decided by the Attorney General. It was claimed on behalf of certain manufacturers of lard substitute, composed of oleo stearin and cottonseed oil, that the mark "Inspected and passed" should be placed on the product, even though the oleo stearin entering into the compound was imported and had not been inspected by the inspectors of the Bureau of Animal Industry. A brief was filed by this office, in which it was contended that under the meat-inspection law it is contemplated that the mark "Inspected and passed" should be placed only upon meat food products which are derived from the carcasses of cattle, sheep, swine, and goats, when the carcasses of animals have received post mortem inspection by the Bureau of Animal Industry. This contention was approved by the Attorney General, who held that the Federal mark of inspection may lawfully be placed only upon products of those animals which have been constantly under the examination of inspectors of the Bureau of Animal Industry "from hoof to the can," and that while interstate commerce in imported meat food products is not prohibited, even though partly manufactured in the United States, they can in no instance bear the Federal mark of approval provided for by the meat-inspection law.

The Attorney General in the course of his opinion reaffirmed his previous decision that imported meats and meat food products are entitled to admission into this country and to interstate commerce subject only to the provisions of the food and drugs act.

THE LACEY ACT.

During the preceding fiscal year 4 cases arising under sections 242 and 243 of the Penal Code of the United States were reported to the Attorney General for appropriate action. Two of these cases were subsequently dismissed because of inability to locate the offenders. The other 2 cases were pending in the hands of the United States attorney at the close of that year. The 2 cases last referred to were tried during the present fiscal year and resulted in the imposition of a fine of $25 upon the offenders, who had shipped quail from Washington, D. C., to Chicago, Ill., in packages which were not marked so that the nature of the contents might be readily ascertained on the outside thereof. During the last five months of the fiscal year 34 cases involving unlawful shipments of game were reported to the Attorney General. Of these 1 involved the shipment of game in an unmarked package; 7 the receipt of game shipped in violation of the laws of the State from which shipped; 13 delivery for interstate shipment of game exported from State of origin illegally; 7 interstate transportation by carriers of game exported from the State of origin illegally; and 6 interstate shipment of game both killed and shipped in violation of laws of the State where killed. One of the most important cases yet decided under the Lacey Act, of which sections 242 to 244 of the Penal Code are codifications, was that of United States *v.* Thomas H. McGowan, arising in the Western District of Pennsylvania out of the receipt by McGowan of five separate consignments of quail from Kentucky, the laws of this State in force at the time of the shipment prohibiting export of quail therefrom, and section 244 of the Penal Code of the United States prohibiting a consignee from knowingly receiving game shipped from another State in violation of the laws of that State. The defendant entered a plea of nolo contendere and was fined $50 for the first offense, sentence being suspended in the remaining 4 cases. The defendant attempted to excuse the offenses on the ground that an act of the legislature of the State of Kentucky some years past which he consulted did not prohibit the shipment of quail from the State. The court in rejecting any such excuse imposed the $50 fine upon the defendant as a warning that in the future he should not rely upon acts of State legislatures passed years before the receipt of game by him. In 3 other cases closed during the year in the Western District of Michigan defendants were fined $25 each. One defendant was acquitted. The remaining cases were pending in the hands of the United States attorneys at the close of the year.

The Biological Survey, by which bureau the evidence of violations of the Lacey Act is secured, perfected arrangements during the latter part of the fiscal year with several State game departments by which the latter will, in the future, furnish the department the evidence in every case arising in the State courts involving the illegal export of game from the respective States, which will be a basis for proceedings in the Federal courts for violation of sections 242 to 244 of the Penal Code. In addition to this, evidence will be secured by one or more field agents of the Biological Survey and the prospect is very encouraging for effective enforcement of the Lacey Act during the succeeding fiscal year. The progress made during the year just closed is most encouraging.

The enforcement of this act is highly important to every State in this Union, as it supplements the enforcement of their laws and is an additional barrier to the illicit traffic in game. By cooperation the game-warden departments of the several States and this department it should be practicable to suppress at least the more extensive illegal traffic in game within a comparatively short time, and now that most of the States are equipped with an efficient and active game department this cooperation is possible.

In a subsequent part of this report, beginning at page 1008, will be found a table setting forth the more important details of the cases reported to the Attorney General during the fiscal year.

THE INSECTICIDE ACT OF 1910.

The legal work of the enforcement of the insecticide act of 1910 for preventing the importation or the transportation in interstate commerce of adulterated or misbranded insecticides and fungicides was undertaken during the fiscal year ending June 30, 1912. This act was approved April 26, 1910, and became effective January 1, 1911, but an appropriation for carrying the act into effect, made in the agricultural appropriation act of March 4, 1911, was not available until July 1, 1911.

The system adopted for the enforcement of the act has now been organized and perfected. In the month of December, 1911, the work had progressed to such a stage that the first apparent violations of the act were transmitted to the Attorney General for prosecution, and the work of reporting violations has since proceeded with expedition.

Under the methods adopted for the handling and consideration of cases under the insecticide act of 1910, all matters of fact are within the jurisdiction of the Insecticide and Fungicide Board, created by General Order No. 143 of the Secretary of Agriculture. After the consideration of the facts, the Insecticide and Fungicide Board submits the same with their recommendations to the office of the Solicitor. In the office of the Solicitor the findings of fact submitted by the Insecticide and Fungicide Board are examined to determine their sufficiency as evidence of law, and recommendations are made accordingly, subject to review by the Secretary of Agriculture, whether citation shall issue for hearings and whether cases shall be reported to the Department of Justice for prosecution.

In a few cases where the evidence of interstate shipment has been lacking, or the offense charged was trivial or technical, letters have been addressed to the manufacturers, calling attention to the findings of the Insecticide and Fungicide Board, indicating the defects in the labeling, and requesting them to advise the department as to what action will be taken to insure the correct branding of goods in future shipments. Failure to reform leads to recommendations for prosecution.

During the fiscal year hearings pursuant to section 4 of the act were recommended on 187 samples. In the cases of 101 samples, no hearings were recommended for the reason that examination or analysis had shown neither adulteration or misbranding within the definitions of the act. In a number of cases, after hearings held, no prosecution was recommended, and in other cases no hearings were recommended for the reasons, among others, that the offense alleged was trivial or technical or the evidence was insufficient on which to proceed against parties primarily responsible for the articles on which the cases were based; that cases based on similar samples had already been reported to the Attorney General for prosecution; that manufacturers had already effected the correction of labeling at the suggestion of the department or had voluntarily made a bona fide effort to reform labeling; or that the articles had been shipped prior to the issue by the department of decisions definitely stating its views as to labeling of such articles.

In the case of 70 samples in which the charges were deemed trivial, unsubstantial, or technical, or where it was deemed impracticable for other reasons to recommend hearings or prosecution, the defects were made subjects of correspondence with the manufacturers with a view to securing the correction of the labeling or the change of the composition of the articles necessary to have them comply strictly with the provisions of the insecticide act of 1910. In general the department has met with acquiescence and ready compliance with its views on the part of manufacturers. By this means strict compliance with the requirements of the law in minor features has been properly secured without recourse to the courts.

Beginning with the first apparent violation of the insecticide act of 1910 reported for prosecution in December, 1911, there were reported to the Attorney General for prosecution during the subsequent six months 57 apparent violations of the statute. Of the prosecutions instituted in these cases, 7 were terminated in the course of the fiscal year ending June 30, 1912, all favorably to the Government. In 6 of these 7 cases criminal prosecutions were instituted against the shippers under section 2 of the act. In 5 of these 6 cases the defendant pleaded not guilty, and in the sixth case a plea of nolo contendere was entered. A fine of $25 and costs was imposed in each of the 6 cases. In the seventh case the proceeding was a seizure of goods under the provisions of section 10 of the act, and the goods seized and condemned were released under a bond of $2,500 and on payment of the costs, amounting to $16.75.

Data in detail as to cases under the insecticide act of 1910 reported and pending or determined during the fiscal year ending June 30, 1912, are set forth in tabulated form on page 1010 below.

The Insecticide and Fungicide Board has been advised on legal questions arising in the administration of the act in a number of instances.

Under section 4 of the insecticide act of 1910 the Secretary of Agriculture is required to publish notices of the judgment of the court in cases prosecuted under the act. One such notice of the judgment of the court in one of the seven cases above mentioned, determined favorably to the Government, has already been published as "Notice of Insecticide Judgment No. 1," and similar notices in six cases were in the course of publication at the close of the year.

MISCELLANEOUS CASES.

ASSAULTS ON DEPARTMENT INSPECTORS.

Two instances of apparent violations of section 62 of the Criminal Code of the United States (34 Stat., 1088, 1100), based upon assaults upon inspectors of the Bureau of Animal Industry in connection with or on account of the performance of their duties, occurred during the period covered by this report. These cases were promptly reported to the Attorney General with requests that they be vigorously prosecuted. In one of these cases both of two defendants pleaded guilty and were fined $50 each. In the other case the defendant pleaded not guilty, and after a vigorous defense was found guilty by the jury and sentenced to 90 days in the house of correction. (Department of Agriculture Miscellaneous Cases Nos. 128 and 135.)

IMPERSONATION OF AGENTS OF THE DEPARTMENT.

During the year six cases were reported to the Attorney General in which the defendants were charged with violating section 32 of the Criminal Code of the United States (34 Stat., 1088), in falsely representing themselves to be employees of the Department of Agriculture. All of these cases were promptly referred to the proper United States attorneys and are now in their hands for prosecution. (Department of Agriculture Miscellaneous Cases Nos. 124, 136, 137, 138, 150, and 156.)

FRAUDULENT INDORSEMENTS OF CHECKS.

There were four cases in which the disbursing officer of the department called attention to the fact that the signatures of payees to checks drawn by district fiscal agents of the department had been forged. These cases were promptly reported to the Attorney General and are now in the hands of the United States attorneys for appropriate action. (Department of Agriculture Miscellaneous Cases Nos. 132, 133, 134, and 155.)

COUNTERFEIT WEATHER FORECASTS.

There was reported to the Department of Justice an apparent violation of section 61 of the Criminal Code of the United States by the New York & London Drug Co., the company publishing or issuing counterfeit weather forecasts or warnings under the title of "Uncle Sam's Predictions." This case was referred to the United States attorney for the Southern District of New York and was pending at the close of the fiscal year of 1912. (Department of Agriculture Miscellaneous Case No. 130.)

FRAUDULENT USE OF THE MAILS.

On information received from George E. Trowbridge, assistant to the Solicitor at Denver, Colo., the Postmaster General was advised of the facts concerning an alleged violation of section 215 of the Criminal Code of the United States by C. J. Patton for use of the mails in a scheme to defraud the United States. Patton was indicted and will be tried at the September, 1912, term of court.

CERTIFICATION OF FALSE VOUCHERS.

There was reported to the Department of Justice during the period covered by this report an alleged violation of section 35 of the Criminal Code of the United States on the part of William H. Brashears for making and presenting for approval false claims against the United States. The jury returned a verdict of not guilty. (Department of Agriculture Miscellaneous Case No. 127.)

In January, 1912, it was brought to the attention of the department that several officials in the Office of Experiment Stations had committed certain irregularities in the administration of the appropriations for irrigation and drainage for the fiscal years 1909 and 1910.

It was alleged that, fearing a deficit in the appropriation for irrigation and drainage for the fiscal year 1909, certain liabilities against said appropriation were met by obtaining funds from individuals to pay a number of expense accounts and pay rolls which were turned back to the Division of Irrigation and Drainage by the accountant of the Office of Experiment Stations, and the persons advancing the funds for the purpose were appointed agents and paid salaries out of the appropriations for irrigation and drainage investigations for the fiscal year 1910. It was not contemplated that the persons so appointed were to render services to the Government under their appointments, nor did they in fact render services, although their salary vouchers were presented and approved by the officials involved. It also appeared that, in addition to being continued on a salary basis until they were reimbursed the amounts advanced by them, several of the persons so appointed were to be continued on the pay roll until they had received interest on their money or something for their trouble. In this manner the appropriations for the fiscal year 1910 were used to supplement the appropriations for 1909. The vouchers submitted and certified to covering payments to the persons who advanced the funds were false vouchers.

After a thorough investigation by the department, in which the officials involved were allowed to present fully their side of the case, the Secretary, on the recommendation of the Director of the Office of Experiment Stations removed from office C. G. Elliott, Chief of Drainage Investigations, and A. D. Morehouse, Acting Chief of Drainage Investigations, who admitted in writing their complicity in the matter, and furloughed without pay F. E. Singleton, accountant in the Office of Experiment Stations, pending further investigation. As it appeared that violations of certain Federal statutes (sec. 5438, R. S., now section 35 of the Criminal Code, and sec. 3679, R. S., as amended by the act of February 27, 1906, 34 Stat., 48) were involved, the facts were reported to the Attorney General, together with all the papers in the case, for appropriate action.

The case was referred by the Attorney General to the United States attorney for the District of Columbia, by whom it was presented to the grand jury, resulting in the indictment of C. G. Elliott, A. D. Morehouse, R. P. Teele, formerly Acting Chief of Irrigation Investigations, and F. E. Singleton. These indictments are pending in the Supreme Court of the District of Columbia at the close of the fiscal year.

SUIT AGAINST DEPARTMENT INSPECTOR.

The appeal taken by Inspector Wiley in the case of Gutierrez *v.* Wiley, pending in the courts of New Mexico, a case based upon the alleged negligence of the inspector in dipping sheep, was dismissed during the year by the United States attorney for the District of New Mexico.

CASES IN THE COURT OF CLAIMS.

The case of Thomas H. Reeves *v.* The United States (Court of Claims No. 30615), which is a claim for salary alleged to be due from this department, is still pending. No action was taken in this case during the year.

In Charles H. Sanborn *v.* The United States (Court of Claims No. 30347) the claimant made a motion to amend the findings of fact, and on January 15, 1912, this motion was overruled. This case is a suit to recover $4,275 for an alleged breach of contract on the part of the Department of Agriculture. The Court of Claims gave judgment for the claimant in February, 1911, in the sum of $700. Prior to the overruling of the motion to amend the findings of fact the claimant, on May 27, 1911, filed notice of a motion for an appeal to the Supreme Court of the United States.

AGREEMENTS FOR THE SEVERAL BUREAUS, OFFICES, AND DIVISIONS.

BUREAU OF PLANT INDUSTRY.

There were 89 contracts, 40 renewals of contracts, 39 leases, 36 renewals of leases, 1 letter terminating a lease, and 1 bond for temporary special disbursing agent prepared for the Bureau of Plant Industry during the fiscal year 1912. This is an increase of 4 leases, 4 renewals of contracts, 5 renewals of leases, and a decrease of 15 contracts and 5 bonds for temporary special disbursing agents over the fiscal year 1911.

BUREAU OF ANIMAL INDUSTRY.

There were 31 contracts, 8 renewals of contracts, 21 leases, 33 renewals of leases, 1 letter terminating a lease, and 1 bond for temporary special disbursing agent prepared for the Bureau of Animal Industry during the fiscal year 1912. This is an increase of 9 renewals of leases and a decrease of 5 contracts, 27 leases, and 4 renewals of contracts over the fiscal year 1911.

WEATHER BUREAU.

There were 14 contracts, 34 leases, 104 renewals of leases, and 5 letters terminating leases prepared for the Weather Bureau during the fiscal year 1912. This is an increase of 4 contracts, 12 leases, 8 renewals of leases, and 4 letters terminating leases, and a decrease of 37 renewals of contracts, 47 contracts, and 1 lease examined over the fiscal year 1911.

FOREST SERVICE.

There were 31 contracts, 4 leases, 2 renewals of leases, and 2 bonds prepared for the Forest Service during the fiscal year 1912. This is an increase of 25 contracts and 1 bond and a decrease of 3 leases and 1 renewal of a lease over the fiscal year 1911.

BUREAU OF CHEMISTRY.

There were 7 contracts, 1 renewal of a contract, 8 leases, and 14 renewals of leases prepared for the Bureau of Chemistry during the fiscal year 1912. This is an increase of 4 contracts, 1 renewal of a contract, and 8 renewals of leases, and a decrease of 6 leases, 1 bond, and 1 letter terminating a lease over the fiscal year 1911.

OFFICE OF EXPERIMENT STATIONS.

There were 7 contracts, 2 renewals of contracts, 26 leases, 7 renewals of leases, and 2 letters terminating leases prepared for the Office of Experiment Stations during the fiscal year 1912. This is an increase of 2 contracts, 12 leases, 1 renewal of a contract, 5 renewals of leases, and 2 letters terminating leases, and a decrease of 1 bond over the fiscal year 1911.

BUREAU OF ENTOMOLOGY.

There were 7 contracts, 1 renewal of a contract, 28 leases, 22 renewals of leases, 1 letter terminating a lease, and 1 bond prepared for the Bureau of Entomology during the fiscal year 1912. This is an increase of 17 leases, 1 renewal of a contract, 16 renewals of leases, and 1 letter terminating a lease, and a decrease of 2 contracts and 1 bond over the fiscal year 1911.

OFFICE OF PUBLIC ROADS.

There were 5 contracts and 1 renewal of a contract prepared for the Office of Public Roads in 1912, an increase of 4 contracts and 1 renewal of a contract, and a decrease of 1 lease renewed over the fiscal year 1911.

DIVISION OF PUBLICATIONS.

There was 1 contract prepared for the Division of Publications in 1912, a decrease of 1 lease and 1 renewal of a contract from the fiscal year 1911.

DIVISION OF ACCOUNTS AND DISBURSEMENTS.

There was 1 contract and 6 bonds for temporary special disbursing agents prepared for the Division of Accounts and Disbursements during the fiscal year 1912, a decrease of 2 contracts and an increase of 1 bond over the fiscal year 1911.

OFFICE OF CHIEF CLERK.

During 1912 there were prepared 4 contracts and 1 bond for the Office of the Chief Clerk, an increase of 3 contracts and 1 bond and a decrease of 2 leases over the fiscal year 1911.

COMMITTEE ON BUILDINGS.

During the fiscal year 1912, 13 renewals of leases were prepared, while in the fiscal year 1911 one contract and no renewals were prepared.

INSECTICIDE AND FUNGICIDE BOARD.

During the fiscal year 1912, 1 renewal of a contract and 1 renewal of a lease was prepared, while in 1911 3 contracts were prepared for the Insecticide and Fungicide Board.

RECAPITULATION.

The following table presents a recapitulation of contracts and leases prepared for the various bureaus, offices, and divisions of the department in the fiscal year 1912 as compared with the number prepared in the fiscal year 1911:

Bureau, division, or office.	1911		1912	
	Contracts.	Leases.	Contracts.	Leases.
Bureau of Plant Industry	104	35	89	39
Bureau of Animal Industry	36	48	31	21
Weather Bureau	10	22	14	34
Forest Service	6	7	31	4
Bureau of Chemistry	3	14	7	8
Experiment Stations	5	14	7	26
Bureau of Entomology	9	11	7	28
Office of Public Roads	1		5	
Division of Publications	1	1	1	
Division of Accounts	3		1	
Office of Chief Clerk	1	2	4	
Committee on Buildings	1			
Bureau of Statistics	1			
Office of Chief Engineer	1			
Insecticide and Fungicide Board	3			
Total	185	154	197	160

Total contracts and leases in 1911	339
Total contracts and leases in 1912	357
Increase in 1912	18

PATENTS FOR DEDICATION TO THE PUBLIC.

During the present fiscal year 19 applications for letters patent were filed, while during the fiscal year 1911, 9 such applications were made, thus making an increase of 10 applications over the preceding year. Of the cases pending, 10 patents were allowed and 3 disallowed. A like number of allowances were obtained during the preceding year. At page 1011 will be found a table setting forth in detail the patent applications prepared and prosecuted by this office during the fiscal year 1912. It will be observed from this table that the subject matters of the inventions are varied and cover a wide range, including processes for drying timber and other moisture-bearing substances, plant protectors, fat extraction apparatus, method of treating Japanese persimmons, device for planting seedlings, processes for treating fiber-yielding materials, method for determining the oxidase content of plant juices, folding plow, thermostat, and various chemical apparatus.

PUBLICATIONS OF THE OFFICE.

In addition to the 755 notices of judgment published by authority of section 4 of the food and drugs act and discussed in detail in another part of this report, the office issued 11 circulars, embodying decisions of the courts construing the statutes intrusted to the department for execution. Six of these embodied decisions on cases arising under the twenty-eight hour law, 3 under the food and drugs act, 1 under the National Forest administrative act, and 1 a decision of the Attorney General under the meat inspection law. There was also published during the year a supplement to the annotated edition of the twenty-eight hour law issued on October 2, 1909, thereby bringing up to date the original edition. The office also published a compilation of references to the legislative history of acts of Congress enforced by the department for use in connection with the construction of any of the provisions contained in such statutes.

At the close of June 30, 1912, the office had in preparation a revision of the compilation entitled "Laws Applicable to the Department of Agriculture," the first edition of which was published in 1908, and embraced a compilation of all statutes, in effect at that time, applicable to the Department of Agriculture. There was also in preparation an appendix to the Use Book of the Forest Service embracing all of the general laws, reference to which is found necessary in the daily administration of the National Forests.

SALARY CLAIMS.

During the fiscal year ending June 30, 1912, 20 claims for balances due the estates of as many employees of various branches of the department who died intestate were examined, the necessary papers prepared for the payment of the same, and advice furnished administrative officers of the department relative thereto.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
2748	James T. Ayers	Virginia, western district.	Shipment of adulterated dried peaches from Virginia to Maryland.	Mistrial; jury disagreed. Consolidated with F. & D. 2797. (Notice of Judgment No. 1808.)
2749	Liebenthal Bros. & Co.	Ohio, northern district.	Shipment of misbranded Damiana from Ohio to Pennsylvania.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1505.)
2755	Strickler Bros.	Ohio, southern district	Shipment of adulterated ice cream from Ohio to Kentucky.	Information filed; pending.
2756	do	do	do	Do.
2757	Reliable Dairy Co.	do	do	Do.
2758	do	do	do	Do.
2759	Vienna Ice Cream Co.	do	do	Do.
2760	do	do	do	Do.
2761	Gem Ice Cream Co.	do	do	Do.
1762	French - Bros. Bauer Co.	do	do	Do.
2772	Sachem's Head Canning Co.	Connecticut	Shipment of adulterated tomato paste from Connecticut to New Jersey.	Plea of guilty; fined $50. (Notice of Judgment No. 1878.)
2773	Star Wafer Co.	Oklahoma, western district.	Shipment of adulterated ice-cream cones from Oklahoma to Missouri.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1783.)
2775	Bradley Smith Co.	Connecticut	Shipment of adulterated and misbranded candy from Connecticut to Pennsylvania.	Plea of guilty by defendant; fined $37.50. (Notice of Judgment No. 1243.)
2776	Atlas Preserving Co.	Maryland	Shipment of adulterated tomato catsup from Maryland to Louisiana.	Plea of guilty by defendant; fined $20. (Notice of Judgment No. 1381.)
2778	Lekas & Drivas	New York, southern district.	Shipment of adulterated olives from New York to Pennsylvania.	Information filed; pending.
2779	American Candy Co.	Wisconsin, eastern district.	Shipment of misbranded candy from Wisconsin to Colorado.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1645.)
2781	Wurst-Bauman-Hunt Co.	Ohio, northern district.	Shipment of misbranded candy from Ohio to Pennsylvania.	Information filed; pending.
2783	E. Greenfield's Sons	New York, southern district.	Shipment of adulterated candy cigars from New York to Massachusetts.	Do.
2784	Harbauer-Marleau Co.	Ohio, northern district.	Shipment of adulterated and misbranded vinegar from Ohio to Missouri.	Do.
2788	Scottsburg Canning Co.	Indiana	Shipment of adulterated tomato pulp from Indiana to West Virginia.	Indictment returned; pending.
2789	National Canning Co.	Missouri, eastern district.	Shipment of adulterated confectionery from Missouri to Louisiana.	Information filed; pending.
2790	Henry H. Shufeldt & Co.	Illinois, southern district.	Shipment of adulterated and misbranded blackberry cordial from Illinois to Missouri.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1667.)
2791	American Coffee Co.	Missouri, eastern district	Shipment of adulterated and misbranded turpentine from Missouri to Illinois.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1443.)
2792	Catawba Candy Co.	Ohio, northern district.	Shipment of misbranded candy from Ohio to Pennsylvania.	Information filed; pending.
2793	Banner Canning Co.	Utah	Shipment of adulterated catsup from Utah to Washington.	Do.

2794	Samuel L. Kelty	New Jersey	Shipment of adulterated tomato paste from New Jersey to Pennsylvania.	Plea of non vult, by defendant; sentence suspended. (Notice of Judgment No. 1227.)
2795	Chris. Deterding	Illinois, southern district.	Shipment of adulterated milk from Illinois to Missouri	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1513.)
2796	Harbauer-Marleau Co.	Ohio, northern district.	Shipment of adulterated and misbranded vinegar from Ohio to Missouri.	Information filed; pending.
2797	James T. Ayers	Virginia, western district.	Shipment of adulterated blackberries from Virginia to Maryland.	Mistrial; jury disagreed. Consolidated with F. & D. No. 2748. (Notice of Judgment No. 1808.)
2800	Hess Bros.	New York, southern district.	Shipment of adulterated confectionery from New York to the District of Columbia.	Information filed; pending.
2801	Wood & Selick	do	Shipment of adulterated "dry milk" from New York to Virginia.	Do.
2802	Farrington & Whitney.	do	Shipment of adulterated nutmegs from New York to Massachusetts.	Plea of guilty by defendant; fined $200. (Notice of Judgment No. 1800.)
2809	Hawley & Hoops	do	Shipment of adulterated and misbranded confectionery from New York to Massachusetts.	Information filed; pending.
2810	Gorton-Pew Fisheries Co.	Massachusetts	Shipment of misbranded drug product from Massachusetts to Colorado.	Do.
2815	C. W. Friedrich & Son.	Indiana	Shipment of adulterated and misbranded buckwheat flour from Indiana to Illinois.	Grand jury failed to indict.
2817	Salem Canning Co.	New Jersey	Shipment of adulterated tomato paste from New Jersey to Illinois.	Plea of non vult by defendant; fined $5. (Notice of Judgment No. 1338.)
2820	A. G. Psiaki Co.	New York, southern district.	Shipment of adulterated black olives from New York to Pennsylvania.	Information filed; pending.
2821	Hawley & Hoops	do	Shipment of adulterated candy from New York to Massachusetts.	Do.
2822	A. C. Soper & Co.	New Jersey	Shipment of adulterated catsup from New Jersey to Massachusetts.	Plea of non vult by defendant; sentence suspended. (Notice of Judgment No. 1326.)
2823	Andrew Baumgartner Co.	Maryland	Shipment of adulterated and misbranded vanilla extract from Maryland to the District of Columbia.	Plea of guilty by defendant; fined $30. (Notice of Judgment No. 1281.)
2824	Polly Bros. Co.	New York, southern district.	Shipment of adulterated black olives from New York to Indiana.	Information filed; pending.
2826	George Close Co.	Massachusetts	Shipment of adulterated confectionery from Massachusetts to Pennsylvania.	Do.
2828	Hawley & Hoops	New York, southern district.	Shipment of adulterated and misbranded confectionery from New York to Massachusetts.	Do.
2829	C. D. Kenny Coffee Co.	Maryland	Shipment of adulterated coffee from Maryland to Georgia	Plea of nolo contendere by defendant; fined $50. (Notice of Judgment No. 1279.)
2830	Magnus, Mabee & Reynard.	New York, southern district.	Shipment of adulterated drug product from New York to Pennsylvania.	Information filed; pending.
2834	Hawley & Hoops	do	Shipment of adulterated and misbranded confectionery from New York to Massachusetts.	Do.
2837	Bettman-Johnson Co.	Ohio, southern district.	Shipment of adulterated and misbranded extract of wintergreen from Ohio to Pennsylvania.	Plea of nolo contendere by defendant; fined $50 and costs. (Notice of Judgment No. 1672.)
2838	do	do	Shipment of misbranded creme de menthe cherries from Ohio to Colorado.	Do.
2839	Rockhill & Victor	New York, southern district.	Shipment of adulterated drug product from New York to Massachusetts.	Information filed; pending.
2842	G. H. Lowell & Co.	do	Shipment of adulterated and misbranded lemon flavor from New York to Virginia.	Do.
2844	Hawley & Hoops	do	Shipment of adulterated confectionery from New York to Massachusetts.	Do.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
2847	Felip Stephen	Arizona	Sale in the Territory of Arizona of adulterated and misbranded ice cream.	Trial by jury; verdict not guilty. (Notice of Judgment No. 1446.)
2848	Louis Rinchini	do	do	Trial by jury; verdict of not guilty by direction of court. (Notice of Judgment No. 1450.)
2849	S. Hirsch Distilling Co.	Missouri, western district.	Shipment of misbranded vermouth from Missouri to Minnesota.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1354.)
2850	N. C. Polson Co	New York, western district.	Shipment of misbranded drug product from New York to District of Columbia.	Information filed; pending.
2853	C. F. Blanke Tea & Coffee Co.	Missouri, eastern district.	Shipment of misbranded coffee from Missouri to Virginia.	Do.
2854	Bradley Smith Co	Connecticut	Shipment of adulterated candy from Connecticut to Massachusetts.	Plea of guilty by defendant; fined $37.50. (Notice of Judgment No. 1244.)
2855	Benwood Brewing Co.	West Virginia, northern district.	Shipment of misbranded beer from West Virginia to Ohio.	Plea of guilty by defendant; fined $30 and costs; continued as to part of shipment. (Notice of Judgment No. 1272.)
2858	John Boyle Co	Maryland	Shipment of misbranded canned peas from Maryland to Florida.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1280.)
2859	S. Fisher & Co	New Jersey	Shipment of adulterated candy from New Jersey to Massachusetts.	Information filed; pending.
2861	New England Confectionery Co.	Massachusetts	Shipment of adulterated confectionery from Massachusetts to Rhode Island.	Do.
2863	Riggi Candy Co	Ohio, northern district.	Shipment of misbranded candy from Ohio to Maryland	Nolle prossed.
2864	Dr. C. Pusheck	Illinois, northern district.	Shipment of misbranded drug product from Illinois to Michigan.	Information filed; pending.
2866	Horton-Cate Mfg. Co.	Michigan, eastern district.	Shipment of adulterated and misbranded lemon extract from Michigan to Georgia.	Plea of nolo contendere by defendant; sentence suspended. (Notice of Judgment No. 1266.)
2867	National Pickle & Canning Co.	Missouri, eastern district.	Shipment of adulterated tomato catsup from Missouri to Tennessee.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1626.)
2868	C. F. Blanke Tea & Coffee Co.	do	Shipment of misbranded coffee from Missouri to Tennessee.	Information filed; pending.
2869	Central Candy Co	Illinois, northern district.	Shipment of misbranded confectionery from Illinois to Minnesota.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1512.)
2870	William Haigh Co	Maryland	Shipment of adulterated and misbranded vanila flavor, from Maryland to New Jersey.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1289.)
2873	Michigan Refining & Preserving Co.	Michigan, western district.	Shipment of adulterated catsup from Michigan to Oklahoma.	Plea of guilty; fined $50. (Notice of Judgment No. 1942.)
2883	Loose-Wiles Biscuit Co.	Missouri, western district.	Shipment of adulterated candy from Missouri to Colorado.	Information filed; pending.
2884	Novelty Candy Co	Illinois, northern district.	Shipment of adulterated confectionery from Illinois to Minnesota.	Do.
2885	Bluthenthal & Bickart	Maryland	Shipment of adulterated blackberry cordial from Maryland to Georgia.	Do.

2886	Magnus, Mabee & Reynard.	New York, southern district.	Shipment of adulterated and misbranded lemon oil from New York to Florida.	Do.
2891	Philadelphia Pickling Co.	Pennsylvania, eastern district.	Shipment of adulterated catsup from Pennsylvania to Maryland.	Plea of guilty by defendant; fined $50 and costs of $12.50. (Notice of Judgment No. 1761.)
2892	R. W. Claxton	District of Columbia	Sale of adulterated fish in the District of Columbia	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1861.)
2893	O. T. Stacy Co.	New York, western district.	Shipment of adulterated confectionery from New York to Massachusetts.	Information filed; pending.
2894	Morgan-Abbott-Barker Co.	Kentucky, western district.	Shipment of adulterated and misbranded vinegar from Kentucky to Georgia.	Do.
2896	St. Louis Syrup & Preserving Co.	Missouri, eastern district.	Shipment of misbranded preserves from Missouri to Kentucky.	Do.
2900	do	do	Shipment of misbranded preserves from Missouri to Wisconsin.	Do.
2901	Otto Kuehne Preserving Co.	Kansas	Shipment of adulterated catsup from Kansas to Oklahoma.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1864.)
2902	A. J. White	District of Columbia	Sale in the District of Columbia of adulterated oysters	Plea of guilty; fined $10. (Notice of Judgment No. 1738.)
2903	V. Del Gaizo	New York, southern district.	Shipment of adulterated tomato sauce from New York to Pennsylvania.	Information filed; pending.
2904	Hawley & Hoops	do	Shipment of adulterated and misbranded candy from New York to Pennsylvania.	Do.
2908	Basilea & Calandra	do	Shipment of misbranded grape brandy from New York to Louisiana.	Plea of guilty by defendant; court suspended sentence. (Notice of Judgment No. 1592.)
2909	do	do	Shipment of misbranded creme de menthe from New York to New Mexico.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1730.)
2910	F. T. Kuehne Flavoring Extract Co.	Missouri, eastern district.	Shipment of adulterated and misbranded fruit flavors from Missouri to Kansas.	Plea of guilty by defendant; fined $22 and costs. (Notice of Judgment No. 1538.)
2913	Mason, Au, & Magenheimer.	New York, eastern district.	Shipment of adulterated and misbranded candy from New York to Massachusetts.	Information filed; pending.
2918	L. D. Middleton	Missouri, western district.	Shipment of misbranded camphor from Missouri to Kansas.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1428.)
2920	Hardie Bros. & Co.	Pennsylvania, western district.	Shipment of adulterated confectionery from Pennsylvania to Illinois.	Information filed; pending.
2922	Caro Vinegar Co.	Michigan, eastern district.	Shipment of adulterated and misbranded vinegar from Michigan to Minnesota.	Plea of nolo contendere; sentence suspended. (Notice of Judgment No. 1418.)
2923	Candy Bros. Manufacturing Co.	Missouri, eastern district.	Shipment of misbranded candy from Missouri to Louisiana.	Information filed; pending.
2929	Pfaffman Egg Noodle Co.	Ohio, northern district.	Shipment of misbranded noodles from Ohio to Pennsylvania.	Plea of guilty; fined $25 and costs. (Notice of Judgment No. 1817.)
2930	Bloodine Corporation	Massachusetts	Shipment of misbranded Headache Checkers from Massachusetts to Tennessee.	Information filed; pending.
2933	Pike County Mineral Springs Co.	Missouri, eastern district.	Shipment of adulterated mineral water from Missouri to Illinois.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1950.)
2938	Warner-Jenkinson Co.	do	Shipment of misbranded crushed strawberries from Missouri to North Carolina.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1543.)
2939	National Candy Co.	New York, western district.	Shipment of adulterated candy from New York to Missouri.	Information filed; pending.
2942	W. J. Bush & Co.	New Jersey	Shipment of adulterated and misbranded fruit juice from New Jersey to Illinois.	Trial by jury; verdict of not guilty by direction of court. (Notice of Judgment No. 1596.)
2943	National Candy Co.	Michigan, eastern district.	Shipment of adulterated candy from Michigan to Missouri.	Information filed; pending.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
2955	C. F. Blanke Tea & Coffee Co.	Missouri, eastern district.	Shipment of misbranded cereal coffee "Kafeka" from Missouri to Virginia.	Information filed; pending.
2956	.....do	.....do	Shipment of misbranded cereal coffee "Kafeka" from Missouri to Louisiana.	Do.
2959	James O'Donnell	District of Columbia	Sale in the District of Columbia of adulterated Fowler's Solution.	Do.
2962	Y. Hikida	Arizona	Sale in Arizona Territory of adulterated and misbranded ice cream.	Do.
2963	West Liberty Condensed Milk Co.	Iowa, southern district.	Shipment of adulterated and misbranded condensed milk from Iowa to Missouri.	Do.
2968	A. G. Psiaki Co	New York, eastern district.	Shipment of adulterated olives from New York to Pennsylvania.	Do.
2969	A. B. Seeley & Son	North Carolina, eastern district.	Shipment of adulterated dried peaches from North Carolina to Maryland.	Plea of guilty by defendants; fined $25 and costs. (Notice of Judgment No. 1262.)
2970	Hall & Bass	Virginia, eastern district.	Shipment of misbranded coffee from Virginia to North Carolina.	Information filed; pending.
2972	Glaser, Kohn & Co	Illinois, northern district.	Shipment of misbranded mustard from Illinois to Kansas.	Do.
2973	Jones Bros. & Co	California, northern district.	Shipment of misbranded vinegar from California to Washington.	Indictment returned; dismissed.
2975	Fitzpatrick Drug Co	Arkansas, eastern district.	Shipment of misbranded drug products from Arkansas to Tennessee.	Plea of guilty by defendant; fined $50 and costs.
2976	O. J. Weeks & Co	New York, southern district.	Shipment of adulterated and misbranded vanilla extract from New York to Louisiana.	Information filed; pending.
2977	American Preserve Co	Pennsylvania, eastern district.	Shipment of adulterated and misbranded catsup from Pennsylvania to Maryland.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1510.)
2980	Heine & Co	New York, southern district.	Shipment of adulterated and misbranded oil of fennel seed from New York to Oregon.	Information filed; pending.
2983	Henry Schierer	.....do	Shipment of adulterated mineral water from New York to New Jersey.	Do.
2984	Theodore Hamm Brewing Co.	Minnesota	Shipment of misbranded malt extract from Minnesota to Missouri.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1397.)
2987	J. H. Miles & Co	Virginia, eastern district.	Shipment of adulterated oysters from Virginia to the District of Columbia.	Information filed; pending.
2988	Delisser & Co	New York, southern district.	Shipment of adulterated and misbranded soda-water flavor from New York to Indiana.	Do.
2989	Heim Brewing Co. (Kansas City Breweries Co.).	Missouri, western district.	Shipment of misbranded malt extract from Missouri to Nebraska.	Do.
2990	A. J. Smith	Ohio, northern district.	Shipment of adulterated and misbranded maple sirup from Ohio to Illinois.	Do.

3005	W. J. Wilson & Son	Washington, eastern district.	Shipment of adulterated and misbranded vinegar from Washington to Idaho.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1290.)
3006	F. Spicola & A. Puglisi.	Minnesota	Shipment of misbranded macaroni from Minnesota to Michigan.	Plea of guilty by defendants; fined $10. (Notice of Judgment No. 1471.)
3008	Rheinstrom Bros	Ohio, southern district.	Shipment of misbranded crème de menthe cherries from Ohio to New York.	Plea of guilty by defendants; fined $25 and costs. (Notice of Judgment No. 1432.)
3009	Milwaukee-Waukesha Brewing Co	Wisconsin, eastern district.	Shipment of misbranded drug product from Wisconsin to Illinois.	Information filed; pending.
3010	American Supply Co	Missouri, eastern district.	Shipment of misbranded blackberry cocktail from Missouri to Illinois.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1628.)
3011	J. M. Bour Co	Missouri, western district.	Shipment of misbranded coffee from Missouri to Oklahoma.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1680.)
3012	Pepsin Syrup Co	Illinois, eastern district	Shipment of misbranded sirup pepsin from Illinois to Tennessee.	Grand jury failed to indict.
3013	Max Glick Co	Ohio, northern district	Shipment of misbranded confectionery from Ohio to North Carolina.	Information filed; pending.
3022	El Dorado Wine Co	District of Columbia	Sale in the District of Columbia of misbranded Damiana Tonic.	Plea of guilty by defendant; fined $25; consolidated with F. & D. No. 3098. (Notice of Judgment No. 1866.)
3023	Charles Bang	New York, southern district.	Shipment of adulterated and misbranded turpentine from New York to Connecticut.	Information filed; pending.
3025	Davis Milling Co	Missouri, western district.	Shipment of misbranded feed from Missouri to Iowa	Plea of guilty; fined $20, with costs of $16.51. (Notice of Judgment No. 1900.)
3026	McMechen Preserving Co.	West Virginia, northern district.	Shipment of adulterated catsup from West Virginia to the District of Columbia.	Information filed; pending.
3032	Country Club Egg Co.	Illinois, northern district.	Shipment of adulterated egg product from Illinois to New York.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1760.)
3033	Gypsum Canning Co	Ohio, northern district	Shipment of adulterated tomato pulp from Ohio to Minnesota.	Information filed; pending.
3036	Barclay Naval Stores Co.	New York, southern district.	Shipment of adulterated and misbranded turpentine from New York to Connecticut.	Do.
3038	Frank Tea & Spice Co.	Ohio, southern district	Shipment of adulterated and misbranded turpentine from Ohio to Georgia.	Nolle prossed.
3040	Fleischman-Clarke Co.	California, northern district.	Shipment of misbranded maraschino cherries from California to Oregon.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1571.)
3044	Mihalovitch Co	Ohio, southern district	Shipment of adulterated and misbranded peppermint essence from Ohio to Indiana.	Nolle prossed.
3045	The Bour Co	Missouri, western district.	Shipment of misbranded coffee from Missouri to Oklahoma.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1680.)
3046	The Pompeian Co	District of Columbia	Shipment of misbranded olive oil from the District of Columbia to Tennessee.	Information filed; pending.
3048	do	do	Shipment of misbranded olive oil from the District of Columbia to Georgia.	Do.
3049	A. C. Soper & Co	New Jersey	Shipment of adulterated catsup from New Jersey to New York.	Plea of non vult by defendant; fined $50. (Notice of Judgment No. 1436.)
3051	The Williams Bros. Co.	Michigan, eastern district.	Shipment of adulterated and misbranded tomato catsup, and misbranded compound jelly from Michigan to Oklahoma.	Plea of nolo contendere by defendant; fined $1 and costs. (Notice of Judgment No. 1600.)
3054	B. E. Leonard	New York, western district.	Shipment of misbranded coaline from New York to Georgia.	Information filed; pending.
3058	Harry Fried (Lehigh Sales Co.).	New York, southern district.	Shipment of adulterated black olives from New York to Missouri.	Nolle prossed.
3063	S. J. Stevens Co	Ohio, southern district	Shipment of adulterated and misbranded cheese from Ohio to Virginia.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1431.)

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F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3065	F. W. Goeke & Co.	Missouri, eastern district.	Shipment of adulterated and misbranded "Sugar Feed" from Missouri to New York.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1629.)
3070	Tetlow Manufacturing Co.	Pennsylvania, eastern district.	Shipment of misbranded drug product from Pennsylvania to New Jersey.	Information filed; pending.
3071	Loewenthal - Strauss Co.	Ohio, northern district	Shipment of misbranded bitters from Ohio to Wisconsin	Do.
3072	do	do	Shipment of misbranded bitters from Ohio to New York	Do.
3073	Williams Bros. Co.	Michigan, eastern district.	Shipment of adulterated tomato catsup from Michigan to Oklahoma.	Plea of nolo contendere by defendant; fined $1 and costs. (Notice of Judgment No. 1600.)
3074	The Natural Mineral Water Co.	Idaho	Shipment of misbranded mineral water from Idaho to Montana.	Information filed; dismissed.
3076	Fort Scott Sorghum Syrup Co.	Kansas	Shipment of misbranded sorghum from Kansas to Iowa	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1943; consolidated with F. & D. No. 3096.)
3080	Board Armstrong & Co.	Virginia, eastern district.	Shipment of adulterated and misbranded vinegar from Virginia to Georgia.	Plea of nolo contendere by defendant; fined $20.
3086	Arthur A. Stilwell & Co.	New York, southern trict.	Shipment of adulterated and misbranded oil of rosemary flowers from New York to Ohio.	Information filed; pending.
3090	Knorpp Candy Co.	New York, eastern district.	Shipment of adulterated confectionery from New York to Massachusetts.	Do.
3091	Hawley & Hoops	New York, southern district.	Shipment of adulterated and misbranded confectionery from New York to Massachusetts.	Do.
3092	Warner Jenkinson Co.	Missouri, eastern district.	Shipment of adulterated and misbranded vanilla extract from Missouri to New York.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1541.)
3095	Simpson & Minturn Fruit & Produce Co.	Arkansas, western district.	Shipment of adulterated and misbranded evaporated apples from Arkansas to Texas.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1401.)
3096	Fort Scott Sorghum Syrup Co.	Kansas	Shipment of misbranded sirup from Kansas to Iowa	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1943; consolidated with F. & D. No. 3076.)
3098	Eldorado Wine Co.	District of Columbia	Sale in the District of Columbia of misbranded Mexican Damiana.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1866; consolidated with F. & D. No. 3022.)
3099	Commonwealth Feed Mills Co.	Missouri, eastern district.	Shipment of misbranded horse feed from Missouri to Florida.	Information filed; pending.
3100	V. Lopez & Co.	New York, southern district.	Shipment of adulterated butter from New York to North Carolina.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1589.)
3101	Iler & Co.	Nebraska	Shipment of misbranded East India Bitters from Nebraska to Montana.	Information filed; pending.
3103	Rheinstrom Bros.	Ohio, southern district.	Shipment of adulterated and misbranded blackberry cordial from Ohio to Pennsylvania.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1430.)
3107	Ohio Confectionery Co.	Ohio, northern district.	Shipment of misbranded candy from Ohio to Maryland	Information filed; pending.
3108	Hawley & Hoops	New York, southern district.	Shipment of adulterated confectionery from New York to Louisiana.	Do.

3109	National Candy Co....	Ohio, southern district.	Shipment of adulterated confectionery from Ohio to Minnesota.	Do.
3110	Charles W. Shaw Co..	Maryland............	Shipment of misbranded banana flavor from Maryland to North Carolina.	Plea of guilty; fined $5. **(Notice of Judgment No. 1675.)**
3111	.....do................	.....do................	Shipment of misbranded strawberry flavor from Maryland to North Carolina.	Do.
3112	.....do................	.....do................	Shipment of misbranded pineapple flavor from Maryland to Virginia.	Do.
3114	H. L. Runkel Co......	Ohio, northern district.	Shipment of adulterated and misbranded candy from Ohio to Massachusetts.	Information filed; pending.
3115	.....do................	.....do................	Shipment of misbranded chocolate fudge from Ohio to Michigan.	Do.
3129	Henry Hix (Washington County Alfalfa Mixed Feed & Milling Co.).	Nebraska..............	Shipment of misbranded alfalfa meal from Nebraska to Iowa.	Plea of guilty by defendant; fined **$15 and costs. (Notice of** Judgment No. 1409.)
3130	Board Armstrong & Co.	Virginia, eastern district.	Shipment of adulterated and misbranded cider vinegar from Virginia to Oklahoma.	Plea of nolo contendere by defendant; fined **$20.**
3131	McCormick & Co. (Inc.)	Maryland............	Shipment of adulterated pepper from Maryland to Virginia.	Nolle prossed.
3134	Magnus Mabee & Reynard.	New York, southern district.	Shipment of adulterated and misbranded oil of lemon from New York to Virginia.	Information filed; pending.
3136	Fort Scott Sorghum Syrup Co.	Kansas................	Shipment of misbranded sorghum from Kansas to Iowa...	Plea of guilty by defendant; fined **$25 and costs. (Notice of** Judgment No. 1762.)
3144	Goshen Pharmacal Co.	Indiana..............	Shipment of adulterated and misbranded drug products from Indiana to Michigan.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1843; consolidated with F. & D. Nos. 3275, 3498, and 3247.)
3146	National Candy Co....	New York, western district.	Shipment of adulterated candy from New York to Missouri.	Information filed; pending.
3147	S. Hirsch Distilling Co.	Missouri, western district.	Shipment of adulterated and misbranded peppermint extract from Missouri to Illinois.	Plea of guilty by defendant; fined **$50 and costs. (Notice of** Judgment No. 1681.)
3150	Williams Bros. Co.....	Michigan, eastern district.	Shipment of misbranded apple jelly from Michigan to Georgia.	Plea of nolo contendere by defendant; fined **$1 and costs.** (Notice of Judgment No. 1600.)
3151	New England Confectionery Co.	Massachusetts.........	Shipment of adulterated candy from Massachusetts to North Carolina.	Information filed; pending.
3152	The City Hay & Grain Co.	Virginia, eastern district.	Shipment of adulterated and misbranded oats from Virginia to North Carolina.	Do.
3153	E. Greenfield's Sons...	New York, southern district.	Shipment of adulterated candy from New York to Massachusetts.	Do.
3154	Wurtzberger Malt Extract Co.	Georgia, northern district.	Shipment of adulterated and misbranded malt extract from Georgia to North Carolina.	Do.
3158	Charles W. Shaw Co..	Maryland............	Shipment of adulterated vanilla flavor from Maryland to North Carolina.	Plea of guilty by defendant; fined **$5. (Notice of Judgment** No. 1675.)
3159	Leder Oil Co..........	Alabama, southern district.	Shipment of misbranded cottonseed meal from Alabama to Vermont.	Information filed; pending.
3166	S. A. Scammon.......	New Hampshire.......	Shipment of misbranded lithia water from New Hampshire to Massachusetts.	Do.
3168	Heine & Co...........	New York, southern district.	Shipment of adulterated and misbranded oil of thyme from New York to Oregon.	Do.
3169	Caruthers Terry Preserving Co.	Ohio, northern district.	Shipment of misbranded "Lekvar" (food product) from Ohio to Pennsylvania.	Plea of guilty by defendant; fined **$25 and costs. (Notice of** Judgment No. 1788.)

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3171	S. Hirsch Distilling Co.	Missouri, western district.	Shipment of misbranded Damiana tonic from Missouri to California.	Information filed; pending.
3172	.....do	.....do	Shipment of misbranded Damiana tonic from Missouri to New Mexico.	Do.
3173	Quinine Whiskey Co.	Kentucky, western district.	Shipment of misbranded drug products from Kentucky to Ohio.	Indictment returned; pending.
3174	.....do	.....do	.....do	Do.
3183	Gorton Pew Fisheries Co.	Massachusetts	Shipment of misbranded fish from Massachusetts to Georgia.	Information filed; pending.
3191	Schwabacher Bro. & Co.	Washington, western district.	Shipment of adulterated and misbranded vanilla flavor from Washington to Alaska.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1429.)
3192	Kreielsheimer Bros.	.....do	Shipment of adulterated and misbranded peppermint essence from Washington to Alaska.	Plea of guilty by defendants; fined $100 and costs. (Notice of Judgment No. 1442; consolidated with F. & D. No. 3281.)
3194	Warner Jenkinson Co.	Missouri, eastern district.	Shipment of adulterated and misbranded vanilla extract from Missouri to Indiana.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1542.)
3196	Anchor Manufacturing Co.	Louisiana, eastern district.	Shipment of adulterated and misbranded orange extract from Louisiana to Texas.	Plea of guilty by defendants; fined $10 and costs. (Notice of Judgment No. 1601.)
3197	Loewenthal Strauss Co.	Ohio, northern district	Shipment of adulterated and misbranded peppermint extract compound from Ohio to New Mexico.	Information filed; pending.
3198	Fischer Bros.	Washington, western district.	Shipment of misbranded salad oil from Washington to Alaska.	Plea of guilty by defendants; fined $75 and costs. (Notice of Judgment No. 1602; consolidated with F. & D. No. 3254.)
3206	Fitzpatrick Drug Co.	Arkansas, eastern district.	Shipment of misbranded drug products from Arkansas to Tennessee.	Information filed; pending.
3207	American Chicle Co.	Oregon	Shipment of misbranded chewing gum from Oregon to Washington.	Do.
3208	Eugene Haberman	Ohio, northern district.	Shipment of adulterated and misbranded vanilla flavoring from Ohio to New York.	Do.
3210	Vincent Ferraro	District of Columbia	Sale in the District of Columbia of adulterated tomato sauce.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1805.)
3213	Loewenthal Strauss Co.	Ohio, northern district.	Shipment of adulterated and misbranded extract of ginger from Ohio to New York.	Information filed; pending.
3215	Fitzpatrick Drug Co.	Arkansas, eastern district.	Shipment of misbranded drug products from Arkansas to Tennessee.	Do.
3217	Steinhorst Morrin Pickle Co.	Missouri, western district.	Shipment of misbranded tomato catsup from Missouri to Nebraska.	Do.
3218	Elgin Creamery Co.	District of Columbia	Sale in the District of Columbia of misbranded butter	Plea of guilty by defendants; fined $10. (Notice of Judgment No. 1736.)
3219	V. Marrone & Rocco Lofaro.	New York, northern district.	Shipment of adulterated mushrooms from New York to Pennsylvania.	Information filed; pending.
3220	Spira & Co.	New York, southern district.	Shipment of adulterated paprika from New York to Illinois.	Plea of guilty by defendant; sentence suspended. (Notice of judgment No. 1631.)

3222	Dr. Nathan Tucker...	Ohio, southern district.	Shipment of misbranded Specific for Asthma from Ohio to Massachusetts.	Nolle prossed.
3223	....do..................	.....do..................	Shipment of misbranded Specific for Asthma from Ohio to Tennessee.	Do.
3224	.....do..................	.....do..................	.....do..................	Do.
3227	Fort Scott Sorghum Syrup Co.	Kansas..................	Shipment of adulterated and misbranded sorghum from Kansas to Iowa.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1763.)
3228	Potter Sloane & O'Donoghue Co.	New York, southern district.	Shipment of adulterated and misbranded coffee from New York to Florida.	Plea of guilty by defendants; sentence suspended. (Notice of Judgment No. 1647.)
3233	Pan-American Manufacturing Co.	Louisiana, eastern district.	Shipment of adulterated and misbranded lemon flavor from Louisiana to Georgia.	Plea of guilty by defendant; fined $100 and costs. (Second offense; Notice of Judgment No. 1605.)
3240	Robert F. Mackenzie Co.	Ohio, northern district.	Shipment of misbranded confectionery from Ohio to Pennsylvania.	Information filed; pending.
3241	Farrington & Whitney.	New York, southern district.	Shipment of misbranded pepper from New York to Illinois.	Plea of guilty by defendant; fined $200. (Notice of Judgment No. 1804.)
3242	James A. McClurg & Son.	.....do..................	Shipment of adulterated confectionery from New York to the District of Columbia.	Information filed; pending.
3244	Stone-Ordean & Wells Co.	Minnesota..............	Shipment of misbranded maraschino cherries from Minnesota to Montana.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1437.)
3247	Goshen Pharmacal Co.	Indiana..................	Shipment of adulterated and misbranded drug products from Indiana to Michigan.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1843; consolidated with F. & D. Nos. 3144, 3275, and 3498.
3250	Arthur J. Thompson..	Illinois, northern district.	Shipment of adulterated apple chops from Illinois to Iowa.	Information filed; pending.
3251	Rigney & Co..........	New York, eastern district.	Shipment of adulterated and misbranded "Maple Hearts" from New York to West Virginia.	Indictment returned; pending.
3254	Fischer Bros..........	Washington, western district.	Shipment of adulterated and misbranded vanilla flavor from Washington to Alaska.	Plea of guilty by defendants; fined $75 and costs. (Notice of judgment No. 1602; consolidated with F. & D. No. 3198.)
3255	Weideman Co..........	Ohio, northern district.	Shipment of misbranded cordial from Ohio to Missouri....	Plea of guilty as to second and third counts of information; nolo contendere as to first and fourth counts; fined $50 and costs. (Consolidated with F. & D. Nos. 3429 and 3438.)
3256	New England Confectionery Co.	Massachusetts..........	Shipment of adulterated confectionery from Massachusetts to Rhode Island.	Information filed; pending.
3258	Foote & Jenks.........	Michigan, eastern district.	Shipment of misbranded lemon extract from Michigan to Missouri.	Trial by jury; verdict guilty; fined $100; defendant has asked 90 days in which to settle bill of exceptions on appeal to the circuit court of appeals. (Notice of Judgment No. 1888.)
3259	Ferris Noeth Stern Co.	Maryland..............	Shipment of adulterated and misbranded vanilla extract from Maryland to Virginia.	Information filed; pending.
3266	Bettman Johnson Co..	Ohio, southern district	Shipment of misbranded "Kummel" from Ohio to Texas..	Plea of nolo contendere by defendant; fined $50 and costs (Notice of Judgment No. 1672.)
3268	Charles H. Adams Co. (Ltd.).	Louisiana, eastern district.	Shipment of adulterated and misbranded castor oil from Louisiana to Texas.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1606.)
3269	Angelo Da Prato......	District of Columbia...	Sale in the District of Columbia of adulterated tomato sauce.	Information filed; pending.
3270	Steinwender & Stoffregen Coffee Co..	Missouri, eastern district.	Shipment of adulterated mace from Missouri to Oklahoma..	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1537.)
3271	S. R. & S. W. Kennedy & Co.	Pennsylvania, eastern district.	Shipment of adulterated evaporated milk from Pennsylvania to Georgia.	Trial by jury. A verdict of not guilty by direction of the court.
3272	Bismark Café, H. Peitz, proprietor.	District of Columbia...	Sale in the District of Columbia of adulterated and misbranded ice cream.	Plea of guilty by defendant; fined $20. (Notice of Judgment No. 1737.)
3273	Huber Fuhrman Drug Mills.	Wisconsin, eastern district.	Shipment of adulterated Stramonium leaves from Wisconsin to Minnesota.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1816.)

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at ist close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3274	Dodge & Olcott Co....	New York, southern district.	Shipment of adulterated oil of thyme from New York to Utah.	Plea of nolo contendere by defendant; fined $10 and costs. (Notice of Judgment No. 1666.)
3275	Gohen Pharmacal Co..	Indiana...............	Shipment of adulterated and misbranded drug products from Indiana to Michigan.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1843; consolidated with F. & D. Nos. 3144, 3498, and 3247.)
3280	Corn Products Refining Co.	Illinois, southern district.	Shipment of misbranded maple sap sirup from Illinois to Washington.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1790.)
3281	Kreielsheimer Bros....	Washington, western district.	Shipment of adulterated and misbranded essence of Jamaica ginger from Washington to Alaska.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1442; consolidated with F. & D. No. 3192.)
3283	Sidney Ross Co.......	New York, southern district.	Shipment of misbranded drug products from New York to California.	Information filed; pending.
3284	.....do...............	.....do...............	.....do...............	Do.
3285	C. J. Phillips..........	New York, northern district.	Shipment of adulterated and misbranded cheese from New York to Pennsylvania.	Do.
3290	Loose Wiles Biscuit Co.	Massachusetts.........	Shipment of misbranded "Arrowroot Biscuits" from Massachusetts to Missouri.	Do.
3293	National Candy Co....	New York, western district.	Shipment of adulterated candy from New York to Massachusetts.	Do.
3297	Standard Syrup Co....	Ohio, northern district	Shipment of adulterated and misbranded sirup from Ohio to Indiana.	Do.
3301	American Supply Co..	Missouri, eastern district.	Shipment of adulterated and misbranded peach brandy from Missouri to Illinois.	Do.
3302	A. Matlick............	California, southern district.	Shipment of misbranded butter from California to Nevada..	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1946.)
3303	A. Bauer Distilling & Importing Co.	Illinois, northern district.	Shipment of adulterated and misbranded sparkling Sauterne and sparkling Burgundy from Illinois to Wisconsin.	Plea of guilty by defendant; fined $2 and costs. Notice of Judgment No. 1665.)
3314	Bowden Lithia Springs Water Co.	Georgia, northern district.	Shipment of misbranded lithia water from Georgia to Tennessee.	Information filed; pending.
3318	McCormick & Co......	Maryland.............	Shipment of adulterated gum asafetida from Maryland to Georgia.	Do.
3319	National Candy Co....	Illinois, northern district.	Shipment of adulterated confectionery from Illinois to Pennsylvania.	Do.
3322	Philadelphia Vinegar Co.	Pennsylvania, eastern district.	Shipment of adulterated vinegar from Pennsylvania to Maryland.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1757.)
3324	Blumenthal Bros......	.....do................	Shipment of misbranded lemon flavor from Pennsylvania to North Carolina.	Plea of guilty; fined $1. (Notice of Judgment No. 2047.)
3325	Oakland Vinegar & Pickle Co.	Michigan, eastern district.	Shipment of adulterated and misbranded sugar vinegar from Michigan to Minnesota.	Information filed; pending.
3326	C. Y. Tully & Co......	Kansas.................	Shipment of adulterated eggs from Kansas to Missouri....	Do.
3327	Coughlin Bros.........	New York, northern district.	Shipment of adulterated confectionery from New York to Massachusetts.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1926.)

3328	Jacob F. Shapiro......	Illinois, northern district.	Shipment of adulterated and misbranded cherry cordial from Illinois to New York.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1851.)
3330	Haarmann Vinegar & Pickle Co.	Iowa, northern district	Shipment of adulterated and misbranded cider vinegar from Iowa to South Dakota.	Information filed; pending.
3351	Michael Fitzgerald....	Wisconsin, eastern district.	Shipment of misbranded cheese from Wisconsin to Missouri	Plea of guilty by defendant; fined $10. (Notice of judgment ment No. 1671.)
3353	Bettman Johnson Co..	Ohio, southern district.	Shipment of misbranded "Phosphates, Gin, and Celery" from Ohio to Virginia.	Plea of nolo contendere by defendant; fined $50 and costs (Notice of Judgment No. 1672.)
3375	Brownell & Field Co..	Rhode Island.........	Shipment of misbranded coffee from Rhode Island to North Carolina.	Plea of nolo contendere by defendant; fined $20 and costs. (Notice of Judgment No. 1853.)
3377	Coughlin Bros.........	New York, northern district.	Shipment of misbranded confectionery from New York to West Virginia.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1927.)
3384	Warner, Jenkinson & Co.	Missouri, eastern district.	Shipment of adulterated and misbranded vanilla extract from Missouri to Texas.	Information filed; pending.
3386	James A. McClurg & Sons (Inc.).	New York, southern district.	Shipment of adulterated confectionery from New York to Massachusetts.	Do.
3389	Lee Bird..............	Oklahoma, western district.	Shipment of adulterated tomato catsup from Oklahoma to Texas.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1920.)
3392	Charles W. Shaw Co..	Maryland.............	Shipment of adulterated and misbranded vanilla flavor from Maryland to Virginia.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1675.)
3409	Daniel Stewart Co....	Indiana...............	Shipment of misbranded concentrated smoke from Indiana to Illinois.	Nolle prossed.
3414	Bettman Johnson Co..	Ohio, southern district.	Shipment of adulterated and misbranded grenadine sirup from Ohio to Texas.	Information filed; pending.
3419	Farrington & Whitney.	New York, southern district.	Shipment of adulterated broken nutmegs from New York to Georgia.	Do.
3420	Bertin & Lepori.....	California, northern district.	Shipment of misbranded gin from California to Nevada...	Indictment returned; pending.
3422	Columbus Pharmacal Co.	Ohio, southern district.	Shipment of adulterated and misbranded drug products from Ohio to Michigan.	Plea of nolo contendere by defendant; fined $5 and costs. (Notice of Judgment No. 1848.)
3424	Haarmann Vinegar & Pickle Co.	Iowa, northern district	Shipment of adulterated and misbranded vinegar from Iowa to South Dakota.	Information filed; pending.
3425	Corn Products Refining Co.	Illinois, southern district.	Shipment of misbranded sirup from Illinois to Oklahoma..	Do.
3426	Haarmann Vinegar & Pickle Co.	Nebraska.............	Shipment of adulterated and misbranded vinegar from Nebraska to Iowa.	Do.
3427	Ben Schloss...........	California, northern district.	Shipment of adulterated and misbranded vinegar from California to Washington.	Indictment returned; pending.
3428	P. E. Sharpless Co....	Maryland.............	Shipment of misbranded evaporated milk from Maryland to New Jersey.	Information filed; pending.
3429	Weideman & Co......	Ohio, northern district.	Shipment of adulterated and misbranded extract of peppermint from Ohio to New York.	Plea of guilty by defendant as to second and third counts of information; nolo contendere as to first and fourth counts; fined $50 and costs.
3436	Crown Distilleries Co..	California, northern district.	Shipment of adulterated and misbranded Jamaica ginger from California to Alaska.	Indictment returned; pending.
3438	Weideman Co.........	Ohio, northern district.	Shipment of misbranded stomach bitters from Ohio to Missouri.	Plea of guilty by defendant as to second and third counts of information; nolo contendere as to first and fourth counts; fined $50 and costs.
3439	Blue Seal Supply Co...	Massachusetts.........	Shipment of adulterated and misbranded soluble lemon from Massachusetts to Texas.	Information filed; pending.
3440	J. W. Harrison........	Virginia, eastern district.	Shipment of misbranded coffee from Virginia to Alabama..	Do.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3441	William Underwood Co.	Massachusetts	Shipment of adulterated sardines in mustard dressing from Massachusetts to California.	Information filed; pending.
3444	John B. Bright & Son (Ltd.).	Indiana	Shipment of misbranded coffee from Indiana to Ohio	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1798.)
3446	F. T. Kuehne Flavoring Extract Co.	Missouri, eastern district.	Shipment of adulterated and misbranded strawberry, pineapple, and pear flavors from Missouri to Iowa.	Information filed; pending.
3447	Bay State Maple Syrup Co.	Massachusetts	Shipment of adulterated and misbranded maple sirup from Massachusetts to Maine.	Do.
3448	Interstate Commerce Co.	Virginia, eastern district.	Shipment of adulterated and misbranded terpeneless extract of lemon from Virginia to North Carolina.	Do.
3455	Chapman Drug Co.	Tennessee, eastern district.	Shipment of adulterated and misbranded lemon, peppermint, and cinnamon extracts from Tennessee to Georgia.	Do.
3456	Charles H. Adams Co.	Louisiana, eastern district.	Shipment of misbranded lemon flavor from Louisiana to Texas.	Do.
3469	Fort Scott Sorghum Syrup Co.	Kansas	Shipment of misbranded sirup from Kansas to Missouri	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1762.)
3470	Bettman Johnson Co.	Ohio, southern district	Shipment of misbranded curaçao from Ohio to New York	Plea of nolo contendere; fined $50 and costs. (Notice of Judgment No. 1672.)
3472	Fort Scott Sorghum Syrup Co.	Kansas	Shipment of misbranded sirup from Kansas to Missouri	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1762.)
3473	Towle Maple Products Co.	Minnesota	Shipment of misbranded apple strawberry jelly and apple raspberry jelly from Minnesota to Delaware.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1947.)
3478	Waltz Co.	Washington, western district.	Shipment of adulterated and misbranded apricot cordial from Washington to Alaska.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1684.)
3485	Continental Distributing Co.	do	do	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1767.)
3486	Avis Cider & Vinegar Co.	Missouri, eastern district.	Shipment of adulterated and misbranded vinegar from Missouri to Iowa.	Information filed; pending.
3492	Williams Bros. Co.	Michigan, eastern district.	Shipment of adulterated and misbranded apple jelly from Michigan to Iowa.	Do.
3497	Swan Meyers Co.	Indiana	Shipment of adulterated and misbranded drug products from Indiana to Michigan.	Trial by jury: verdict of guilty; fined $200 and costs. (Notice of Judgment No. 1796.)
3498	Goshen Pharmacal Co.	do	do	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1843; consolidated with F. & D. Nos. 3144, 3275, and 3247.)
3506	St. Louis Glue Manufacturing Co.	Missouri, eastern district.	Shipment of adulterated and misbranded gelatin from Missouri to Indiana.	Information filed; pending.
3511	Ferris Noeth Stern Co.	Maryland	Shipment of adulterated and misbranded malt saccharine from Maryland to Georgia.	Do.
3516	Just Milling & Feed Co.	Tennessee, middle district.	Shipment of misbranded horse feed from Tennessee to Florida.	Plea of guilty; fined $25 and costs. (Notice of Judgment No. 1686.)

3517	American Pure Coffee & Spice Co.	Ohio, southern district.	Shipment of adulterated and misbranded vanilla and lemon flavors from Ohio to West Virginia.	Plea of guilty; fined $50 and costs. (Notice of Judgment No. 1830.)
3519	Bruce & West Manufacturing Co.	Ohio, northern district.	Shipment of adulterated and misbranded strawberry fruit juice from Ohio to New York.	Information filed; pending.
3520	P. E. Sharpless Co.	Maryland	Shipment of adulterated and misbranded evaporated milk from Maryland to Virginia.	Do.
3521	....do	Pennsylvania, eastern district.	Shipment of adulterated and misbranded evaporated milk from Pennsylvania to Virginia.	Do.
3522	George Ziegler Co.	Wisconsin, eastern district.	Shipment of adulterated candy from Wisconsin to Colorado.	Plea of guilty; fined $25.
3523	Loff Jacobs	Ohio, southern district.	Shipment of adulterated and misbranded graham flour from Ohio to West Virginia.	Plea of nolo contendere; fined $5 and costs. (Notice of Judgment No. 1846.)
3524	George Ziegler Co.	Wisconsin, eastern district.	Shipment of adulterated candy from Wisconsin to Colorado.	Information filed; plea of guilty; fined $25.
3534	Kelley-Whitney Co.	New York, western district.	Shipment of adulterated and misbranded vanilla extract and misbranded lemon and orange extracts from New York to the District of Columbia.	Information filed; pending.
3535	Toledo Pharmacal Co.	Ohio, northern district	Shipment of adulterated and misbranded drug products from Ohio to Michigan.	Do.
3536	Gray, McLean & Percy	Oregon	Shipment of adulterated and misbranded oleo-resin vanilla from Oregon to Washington.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1687.)
3540	Irwin, Neisler & Co.	Illinois, southern district.	Shipment of adulterated and misbranded nitroglycerine tablets from Illinois to Indiana.	Information filed; pending.
3546	Non Alcoholic Extract Co.	Missouri, eastern district.	Shipment of adulterated and misbranded nonalcoholic vanilla from Missouri to Oklahoma.	Do.
3547	McCoy Howe Co.	Indiana	Shipment of adulterated and misbranded drug products from Indiana to Michigan.	Plea of guilty by defendant; fined $200 and costs. (Notice of Judgment No. 1810.)
3551	Lafayette Pharmacal Co.	....do	Shipment of adulterated and misbranded nitroglycerine tablets from Indiana to Michigan.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1799.)
3552	Price & Lucas Cider & Vinegar Co.	Pennsylvania, middle district.	Shipment of adulterated and misbranded vinegar from Pennsylvania to New York.	Plea of nolo contendere; fined $100 and costs. Notice of Judgment No. 1849.)
3553	Oscar J. Weeks	New York, southern district.	Shipment of adulterated and misbranded Wild Cherry flavor from New York to Texas.	Information filed; pending.
3555	Allen Bros. Co.	Nebraska	Shipment of adulterated and misbranded rice from Nebraska to Utah.	Do.
3562	National Tube Flavor Co.	New York, western district.	Shipment of misbranded lemon flavor from New York to Pennsylvania.	Do.
3564	Edwin A. Rogers & Co.	Massachusetts	Shipment of adulterated shellac from Massachusetts to Tennessee.	Do.
3565	Henry H. Shufeldt & Co.	Illinois, southern district.	Shipment of adulterated and misbranded blackberry juice from Illinois to Missouri.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1667.)
3566	Leonard A. Treat	Massachusetts	Shipment of misbranded whitefish from Massachusetts to Georgia.	Information filed; pending.
3567	Jones Bros., Castleman & Blakemore.	Kentucky, western district.	Shipment of misbranded molasses from Kentucky to South Dakota.	Do.
3569	Louis Maull Cheese & Fish Co.	Missouri, eastern district.	Shipment of misbranded fish from Missouri to Oklahoma.	Do.
3571	Logan Johnson & Co.	Massachusetts	Shipment of misbranded preserves from Massachusetts to Pennsylvania.	Do.
3572	Frank Tea & Spice Co.	Ohio, southern district	Shipment of adulterated mace from Ohio to Colorado	Do.
3579	Allen & Wheeler Co.	....do	Shipment of adulterated and misbranded "Graham flour" from Ohio to Indiana.	Do.

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F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3580	Farrington & Whitney	New York, eastern district.	Shipment of misbranded black pepper from New York to Ohio.	Information filed; pending.
3583	Joseph Finora	California, northern district.	Shipment of adulterated and misbranded Tamarind syrup from California to Arizona.	Indictment returned; pending.
3584	Triumph Catsup & Pickle Co.	Illinois, southern district.	Shipment of adulterated and misbranded prepared mustard and horseradish from Illinois to Texas.	Plea of nolo contendere; fined $10 and costs. (Notice of Judgment No. 1774.)
3585	Brewster Cocoa Manufacturing Co.	New Jersey	Shipment of adulterated and misbranded cocoa from New Jersey to Pennsylvania.	Information filed; pending.
3603	Richardson, Beebe Co.	New York, western district.	Shipment of misbranded cream from New York to Pennsylvania.	Do.
3604	do	do	Shipment of misbranded evaporated milk from New York to Pennsylvania.	Do.
3608	S. Hirsch Distilling Co.	Missouri, western district.	Shipment of misbranded bitters from Missouri to Minnesota.	Do.
3609	West Coast Grocery Co.	Washington, western district.	Shipment of misbranded evaporated milk from Washington to Alaska.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1747.)
3623	P. E. Sharpless Co.	Maryland	Shipment of adulterated and misbranded evaporated milk from Maryland to the District of Columbia.	Information filed; pending.
3629	W. C. Wampler	Virginia, western district.	Shipment of adulterated dried apples from Virginia to Maryland.	Indictment returned; pending.
3634	M. & K. Gottstein	Washington, western district.	Shipment of adulterated and misbranded blackberry cordial from Washington to Alaska.	Plea of guilty by defendant; fined $25 and costs.
3635	A. K. Wyant	Virginia, western, district.	Shipment of adulterated dried apples from Virginia to Maryland.	Indictment returned; pending.
3636	R. B. McQuay	do	do	Do.
3637	J. F. Eckard	do	do	Do.
3638	Potter, Sloane O'Donohue Co.	New York southern district.	Shipment of misbranded coffee from New York to Alabama	Information filed; pending.
3640	Alberto Milanesi et al.	do	Shipment of adulterated wines and liquors from New York to New Jersey.	Prosecution under section 37, Criminal Code; plea of guilty by defendant Milanesi; sentenced to 7 months' imprisonment in New York County Penitentiary. (Notice of Judgment No. 1754.)
3642	W. L. Baker	New York, northern district.	Shipment of adulterated and misbranded maple sirup from New York to New Jersey.	Plea of guilty by defendant; sentence suspended during good behavior. (Notice of Judgment No. 1919.)
3643	Mihalovitch Co.	Ohio, southern district.	Shipment of adulterated and misbranded Jamaica ginger and wintergreen essences from Ohio to Michigan.	Information filed; pending.
3645	National Pickle & Candy Co.	Missouri, eastern district.	Shipment of adulterated and misbranded salad dressing from Missouri to Colorado.	Do.
3649	Fredonia Wine Co.	New York, western district.	Shipment of adulterated and misbranded grape juice from New York to Tennessee.	Do.
3650	Pevely Dairy Co.	Illinois, eastern district.	Shipment of adulterated milk from Illinois to Missouri	Do.

3651	Theo. Haar	do	do	Do.
3652	Henry Neuhaus	Illinois, southern district.	do	Do.
3653	Edward Garde	do	do	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1778.)
3654	Louis Lueker	do	do	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1779.)
3655	William Knolhoff	Illinois, eastern district.	do	Information filed; pending.
3656	Fred A. Boeser	Illinois, southern district.	do	Do.
3757	John Hoemm	do	do	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1780.)
3658	Henry Burmeister	Illinois, eastern district.	do	Information filed; pending.
3659	Herman Rohrkaste	Illinois, southern district.	do	Plea of guilty; fined $25 and costs. (Notice of Judgment No. 1781.)
3660	John Zika	do	do	Plea of guilty; fined $25 and costs. (Notice of Judgment No. 1782.)
3661	John Schulte, sr.	Illinois, eastern district.	do	Information filed; pending.
3662	F. M. Rule	Illinois, southern district.	do	Do.
3663	T. J. Virgin	do	do	Plea of nolo contendere; fined $25 and costs.
3664	William Kenthe	do	do	Information filed; pending.
3665	Charles W. Keingery	do	do	Do.
3666	Ed J. Marburger	do	do	Do.
3667	Frank Ortman	Illinois, eastern district.	do	Do.
3668	Henry Roeckenhaus	do	do	Do.
3670	Southern Milk Condensing Co.	do	Shipment of adulterated cream from Illinois to Missouri	Do.
3671	Wm. Schoeck	Illinois, southern district.	Shipment of adulterated milk from Illinois to Missouri	Do.
3673	Frank Budde	Illinois, eastern district.	do	Do.
3674	Gerd B. Johnson	Illinois, southern district.	do	Do.
3675	Caspar Krebs	Illinois, eastern district.	do	Do.
3576	Herman Timmerman	do	do	Do.
3677	Harm Whitehouse	Illinois, southern district.	do	Do.
3678	John A. Braundmaer	do	do	Do.
3681	Union Dairy Co	Missouri, eastern district.	Shipment of adulterated pasteurized milk from Illinois to Missouri.	Do.
3682	do	do	do	Do.
3683	do	do	do	Do.
3684	do	do	do	Do.
3685	do	do	do	Do.
3686	do	do	Shipment of adulterated certified milk from Illinois to Missouri.	Do.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3688	Pearly Haycraft	Illinois, southern district.	Shipment of adulterated milk from Illinois to Missouri	Information filed; pending.
3689	do	do	do	Do.
3690	Henry Hunt	do	do	Do.
3691	Gerhart Sprohe	Illinois, eastern district	do	Do.
3692	St. Louis Dairy Co.	Missouri, eastern district.	do	Do.
3693	Arthur H. Smith	Illinois, southern district.	do	Do.
3694	John Mane	Illinois, eastern district.	do	Do.
3695	do	do	do	Do.
3696	Arthur H. Smith	Illinois, southern district.	do	Do.
3701	Henry V. Espenschied	do	do	Do.
3702	Wm. Nieman	do	do	Do.
3703	Henry Rust	do	do	Do.
3704	John Unterbrink	do	do	Do.
3706	Henry Knolhoff	Illinois, eastern district.	do	Do.
3707	Fred C. Zoelger	Illinois, southern district.	do	Do.
3708	August Traeme	Illinois, eastern district.	do	Do.
3709	Fred Unterbrink	Illinois, southern district.	do	Do.
3710	do	do	do	Do.
3712	Ben. Welling	Illinois, eastern district.	do	Do.
3713	Antoine Hempen	do	do	Do.
3714	Wm. Reuter	do	do	Do.
3715	August Schroeder	do	do	Do.
3717	Ernest Grefe	do	do	Do.
3718	Carl Zimmerman	do	do	Do.
3719	Z. E. Bivens	Illinois, southern district.	do	Do.
3720	do	do	do	Do.
3721	John Spihlmann	Illinois, eastern district.	do	Do.
3722	Ben Welling	do	do	Do.
3723	Wm. G. Richter	do	do	Do.
3724	do	do	do	Do.

3725	H. M. Cooper	Illinois, southern district.	do	Do.
3726	B. J. Richter	Illinois, eastern district.	do	Do.
3728	Albert Orrell	do	do	Do.
3729	Joseph Kohrmann	do	do	Do.
3730	James Morrison	Illinois, southern distric..	do	Do.
3731	Mrs. Charles Davis	Illinois, eastern district.	do	Do.
3732	Clem Mane	do	do	Do.
3733	Herman Ahlers	do	do	Do.
3736	Wm. E. Dietzel	Illinois, southern district.	do	Do.
3737	Eph Kierle	do	do	Do.
3738	Mrs. Henry Sprehe	Illinois, eastern district.	do	Do.
3739	Wm. Stille	Illinois, southern district.	do	Do.
3740	Otto Kierle	do	do	Do.
3742	Margaret Langenhorst	Illinois, eastern district.	do	Do.
3743	H. C. Daube	Illinois, southern district.	do	Do.
3744	Fred Klopmeier	do	do	Do.
3745	Mrs Katherine Haar	Illinois, eastern district.	do	Do.
3746	Walter F. Rinkel	Illinois, southern disrict.	do	Do.
3747	Henry Schulte	Illinois, eastern district.	do	Do.
3748	L. J. Wood	Illinois, southern district.	do	Do.
3749	Camp Bros	do	do	Do.
3750	do	do	do	Do.
3751	Wm. E. Cooper	do	do	Do.
3753	C. E. Obert	do	do	Do.
3754	L. A. Spies	do	do	Do.
3755	Charles Isaacs	do	do	Do.
3756	Henry Unterbrink	do	do	Do.
3757	John Kloeckner	Illinois, eastern district	do	
3759	Aug. Huelsman	do	do	Do.
3760	John Michael	do	do	Do.
3761	Gus Burjus	Illinois, southern district.	do	Do.
3762	Ben Luebbers	Illinois, eastern district	do	Do.
3763	Wm. G. Johnson	Illinois, southern district.	do	Do.
3765	do	do	do	Do.
3769	Henry Johnson	do	do	Do.
3771	Graefman Dairy Co	Illinois, eastern district	do	Do.
3772	Henry Brunn	do	do	Do.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3773	Charles Zoelzer	Illinois, southern district.	Shipment of adulterated milk from Illinois to Missouri	Information filed; pending
3774	do	do	do	Do.
3775	Henry De Werf	do	do	Do.
3776	Henry E. De Werf	do	do	Do.
3777	New England Confectionery Co.	Massachusetts	Shipment of adulterated and misbranded candy from Massachusetts to West Virginia.	Do.
3779	Bettman Johnson Co.	Ohio, southern district	Shipment of misbranded Kummel from Ohio to Virginia	Do.
3780	West Coast Grocery Co.	Washington, western district.	Shipment of adulterated and misbranded apple-cider vinegar from Washington to Alaska.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1746.)
3781	Mihalovitch Co.	Ohio, southern district	Shipment of misbranded Kummel from Ohio to Minnesota.	Information filed; pending.
3782	Charles Jacquin et Cie.	New York, southern district.	Shipment of adulterated and misbranded essence of wintergreen from New York via Pennsylvania to New York.	Do.
3786	John P. Dousman Milling Co.	Wisconsin, eastern district.	Shipment of adulterated and misbranded Gem Graham flour from Wisconsin to Michigan.	Do.
3791	Atlas Preserving Co.	Maryland	Shipment of adulterated catsup from Maryland to the District of Columbia.	Do.
3800	Pierce City Packing Co.	Missouri, western district.	Shipment of adulterated tomato catsup from Missouri to Kansas.	Plea of guilty by defendant; fined $50 and costs.
3801	Appleby Bros.	Arkansas, western district.	Shipment of adulterated and misbranded apples from Arkansas to Illinois.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1867.)
3803	Shobe Manufacturing Co.	Ohio, southern district	Shipment of adulterated and misbranded Egg-o-let from Ohio to Kentucky.	Information filed; pending.
3808	Sutliff & Case Co.	Illinois, southern district.	Shipment of adulterated and misbranded drug products from Illinois to Indiana.	Do.
3810	Shobe Manufacturing Co.	Ohio, southern district	Shipment of adulterated and misbranded Egg-o-let from Ohio to Pennsylvania.	Do.
3817	E. C. Flaccus Co.	West Virginia, northern district.	Shipment of adulterated catsup from West Virginia to New York.	Plea of guilty by defendant; fined $10 and costs.
3827	National Pickle & Canning Co.	Missouri, eastern district.	Shipment of adulterated tomato catsup from Missouri to Tennessee.	Information filed; pending.
3831	L. Shepp Co.	New York, southern district.	Shipment of adulterated and misbranded shredded cocoanut from New York to Pennsylvania.	Do.
3832	do	do	do	Do.
3835	Bertin & Lepori	California, northern district.	Shipment of adulterated and misbranded Jamaica ginger from California to Arizona.	Do.
3846	B. S. Ayars & Sons Co.	New Jersey	Shipment of adulterated tomato catsup from New Jersey to Pennsylvania.	Do.
3847	Frederick G. Reader	Illinois, southern district.	Shipment of adulterated milk from Illinois to Missouri	Do.
3849	Rudolph F. Johnson	do	do	Do.
3850	do	do	do	Do.

3851	Edward W. Froelke	do	do	Do.
3852	Wm. J. Wilson	do	do	Do.
3853	Edward H. Fischer	do	do	Do.
3855	Theodore B. Dorsey	do	do	Do.
3856	do	do	do	Do.
3857	H. W. Hener	do	do	Do.
3861	Joseph L. Schafer	do	do	Do.
3862	Frank Kierle	do	do	Do.
3863	Anton Schweirjohn	do	do	Do.
3864	Christian Reinkensmeyer.	do	do	Do.
3865	Frederick Lampe	do	do	Do.
3866	Bernard Grawe	do	do	Do.
3867	Theodore C. Albers	do	do	Do.
3868	B. Gebke	do	do	Do.
3870	Wall Rice Milling Co. (Ltd.).	Louisiana, western district.	Shipment of misbranded rice from Louisiana to Minnesota.	Do. Do.
3871	Charles Dennery	Louisiana, eastern district.	Shipment of adulterated and misbranded terpeneless lemon oil from Louisiana to Texas.	Do.
3877	Moyse Bros	Ohio, southern district	Shipment of adulterated and misbranded peach brandy from Ohio to Florida.	Do.
3879	A. A. Strohecker	New Jersey	Shipment of adulterated and misbranded fig and honey cakes from New Jersey to New York.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1745.)
3889	McCormick & Co.	Maryland	Shipment of adulterated and misbranded drug product from Maryland to Georgia.	Information filed; pending.
3890	C. A. White Co	Wisconsin, eastern district.	Shipment of misbranded cheese from Wisconsin to Tennessee.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1765.)
3891	do	do	do	Do.
3897	Philadelphia Pickling Co.	New Jersey	Shipment of adulterated tomato pulp from New Jersey to Pennsylvania.	Information filed; pending.
3899	Charles Rief Co	Tennessee, eastern district.	Shipment of misbranded hair tonic from Tennessee to Georgia.	Do.
3900	W. F. Assan Canning Co.	Maryland	Shipment of adulterated canned tomatoes from Maryland to Louisiana.	Do.
3901	Meadowbrook Condensed Milk Co.	Washington, western district.	Shipment of misbranded condensed milk from Washington to Alaska.	Do.
3902	Joseph Finora	California, northern district.	Shipment of adulterated and misbranded Tamarind Syrup from California to Nevada.	Indictment returned; pending.
3906	Royal Remedy & Extract Co.	Ohio, southern district	Shipment of misbranded extracts from Ohio to Illinois	Information filed; pending.
3912	E. Krauser & Bro	Pennsylvania, middle district.	Shipment of misbranded liquid extract of "Smoke" from Pennsylvania to Illinois.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1842.)
3916	Roberts Bros	Maryland	Shipment of adulterated canned tomatoes from Maryland to Louisiana.	Information filed; pending.
3918	Sauerston & Brown	Ohio, southern district	Shipment of adulterated and misbranded confectionery from Ohio to Kentucky.	Do.
3923	Mihalovitch Co	do	Shipment of adulterated and misbranded blackberry flavor juice from Ohio to Missouri.	Do.
3924	S. Hirsch Distilling Co. (Minuet Cordial Co.).	Missouri, western district.	Shipment of adulterated and misbranded peppermint extract from Missouri to New Mexico.	Do.
3946	National Pickle & Canning Co.	Missouri, eastern district.	Shipment of adulterated tomato catsup from Missouri to Louisiana.	Do.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
3947	John T. Milliken & Co.	Missouri, eastern district.	Shipment of adulterated and misbranded drug product from Missouri to Indiana.	Information filed; pending.
3955	Wisconsin Butter & Cheese Co.	Wisconsin, eastern district.	Shipment of misbranded cheese from Wisconsin to Indiana.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1812.)
3960	American Products Co.	Ohio, southern district	Shipment of misbranded "Zanol Non-alcoholic Pure Food Flavor" from Ohio to Indiana.	Information filed; pending.
3961	....do	....do	Shipment of misbranded nonalcoholic pistachio and violet flavors and adulterated and misbranded peppermint flavor from Ohio to Indiana.	Do.
3962	Upjohn Co	Michigan, western district.	Shipment of misbranded drug products from Michigan to Washington.	Do.
3976	Michael A. Wikel	Ohio, southern district	Shipment of adulterated milk from Ohio to West Virginia.	Do.
3982	Meyer Bros. Drug Co.	Missouri, eastern district.	Shipment of adulterated and misbranded oil of cajuput from Missouri to Texas.	Do.
3983	Schwabacher Bros. & Co.	Washington, western district.	Shipment of adulterated and misbranded catsup from Washington to Alaska.	Do.
3988	Sprague & Dougherty.	New York, eastern district.	Shipment of adulterated oysters from New York to Pennsylvania.	Do.
3992	Fruit Puddine Co	Maryland	Shipment of misbranded fruit puddine from Maryland to Ohio.	Do.
3993	Dixie Syrup Co	....do	Shipment of adulterated and misbranded sirup from Maryland to Pennsylvania.	Do.
3994	Hance Bros. & White	Pennsylvania, eastern district.	Shipment of adulterated and misbranded soluble chocolate from Pennsylvania to California.	Do.
4011	J. S. Farren & Co	Maryland	Shipment of misbranded garden spinach from Maryland to New York.	Do.
4015	Henry H. Ottens Manufacturing Co.	Pennsylvania, eastern district.	Shipment of adulterated and misbranded coloring matter for confectionery from Pennsylvania to Tennessee.	Do.
4023	Davis Bros. Cheese Co.	Wisconsin, eastern district.	Shipment of misbranded cheese from Wisconsin to Tennessee.	Plea of nolo contendere by defendant; fined $25. (Notice of Judgment No. 1870.)
4034	Ambrosia Chocolate Co.	....do	Shipment of misbranded cocoa from Wisconsin to Nebraska.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1839.)
4035	Gorton Pew Fisheries Co.	Massachusetts	Shipment of adulterated and misbranded shredded fish from Massachusetts to Missouri.	Information filed; pending.
4050	Western Buyers' Association (Inc.).	Missouri, western district.	Shipment of adulterated and misbranded terpeneless extract of lemon from Missouri to Oklahoma.	Do.
4061	C. A. Perkins	Connecticut	Shipment of adulterated milk from Connecticut to Rhode Island.	Do.
4062	Ed. Palmer	....do	....do	Do.
4063	W. Phillips	....do	....do	Do.
4064	Albert Pichoto	....do	....do	Do.
4065	J. Newton Phelps	....do	....do	Do.
4066	Thomas Newman	....do	....do	Do.

4067	Isaac Nelleber	do	do	Do.
4068	Charles J. Ryan	do	do	Do.
4069	Nathan Yaffa	do	do	Do
4070	Solomon Simon	do	do	Do.
4071	Carl Anderson	do	do	Do.
4072	A. Ames	do	do	Do.
4073	Mrs. Wm. Adams	do	do	Do.
4074	J. L. Appley	do	do	Do.
4075	Jake Boratz	do	do	Do.
4076	H. C. Hopkins	do	do	Do.
4077	W. Burdick	do	do	Do.
4078	A. P. Bennett	do	do	Do.
4079	Earl Bennett	do	do	Do.
4080	Isaac Bernstein	do	do	Do.
4081	J. E. Thompson	do	do	Do.
4082	Samuel Winstein	do	do	Do.
4083	L. Selzer	do	do	Do.
4084	C. Tyler	do	do	Do.
4085	Isaac Sekinsky	do	do	Do.
4086	Harry Solovay	do	do	Do.
4087	Simon Sullivan	do	do	Do.
4088	Rood Bros	do	do	Do.
4089	Lemuel Rattner	do	do	Do.
4090	F. Mason Partelo	do	do	Do.
4091	Martin Clark	do	do	Do.
4092	B. S. Gallup	do	do	Do.
4093	C. B. Gallup	do	do	Do.
4094	Michael Gineritzman	do	do	Do.
4095	James B. Gray	do	do	Do.
4096	Nathan Greenberg	do	do	Do.
4097	C. M. Crandall	do	do	Do.
4098	Geo. D. Coates	do	do	Do.
4099	Simon Coffee	do	do	Do.
4100	Henry Dorrance	do	do	Do.
4101	Harry Davis	do	do	Do.
4102	John Frink	do	do	Do.
4103	Steve Feins	do	do	Do.
4104	Jacob Fox	do	do	Do.
4105	Roger Foote	do	do	Do.
4106	Abraham Filler	do	do	Do.
4107	Adam Checkovitz	do	do	Do.
4108a	Abraham Gitlin	do	do	Do.
4108b	Samuel Gitlin	do	do	Do.
4109	Samuel Goldstein	do	do	Do.
4110	Andrew B. Northrup	do	do	Do.
4111	C. H. Kenyon	do	do	Do.
4112	Katherine Konaszewski.	do	do	Do.
4113	J. Kravetsky	do	do	Nolle prossed.
4114	Chester G. Maine	do	do	Information filed; pending.
4115	Patrick Murray	do	do	Do.
4116	H. Minck	do	do	Do.
4117	J. Minck	do	do	Do.

Cases under the food and drugs act of June 30, 1906, reported for criminal prosecution during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
4118	Wm. S. Lamb	Connecticut	Shipment of adulterated milk from Connecticut to Rhode Island.	Information filed; pending.
4119	Harry Litchnik	do	do	Do.
4120	Jacob Levine	do	do	Do.
4121	George E. Larkham	do	do	Do.
4122	Wm. Elliott	do	do	Do.
4137	Michael P. Howlett	New Jersey	Shipment of misbranded oysters from New Jersey to the District of Columbia.	Do.
4138	do	do	do	Do.
4140	H. C. Schrank Co.	Wisconsin, eastern district.	Shipment of adulterated and misbranded orange flavor from Wisconsin to Illinois.	Plea of guilty by defendant; fined $50. **(Notice of Judgment 1876.)**
4157	Montgomery, Ward & Co.	Missouri, western district.	Shipment of adulterated cream tartar baking powder and adulterated cream tartar from Missouri to Kansas.	Information filed; pending.
4159	Belle Isle Mustard Works.	Michigan, eastern district.	Shipment of adulterated and misbranded mustard from Michigan to Ohio.	Do.
4221	V. Lopez & Co.	New York, southern district.	Shipment of adulterated and misbranded butter from New York to Georgia.	Do.

SUMMARY.

Cases terminated in favor of the Government	153
Cases terminated in favor of the defendants	6
Number of indictments returned by grand jury	3
Cases nolle prossed	9
Mistrials	2
Cases dropped	35
Cases pending in the courts	407
Cases pending in the Department of Justice	376
Total criminal cases reported for prosecution	**991**

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined the during year or pending in the courts at its close.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
2751	4 barrels of turpentine	Connecticut	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1373.)
2769	40 bags of oats	North Carolina, western district	do	Libel filed; seizure effected; pending.
2780	10 half barrels of vinegar	Mississippi, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1787.)
2787	500 pails of jelly	Colorado	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1172.)
2803	798 cases of sardines	Texas, southern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1567.)
2804	1 barrel of cherry sirup	Pennsylvania, eastern district	Adulterated and misbranded.	Libel filed; seizure effected; pending.
2806	1 barrel of blackberry cordial	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1205.)
2807	100 boxes of pepper	New Jersey	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1568.)
2808	700 cases of evaporated milk	Louisiana, eastern district	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1478.)
2813	140 boxes of pepper	Illinois, northern district	do	Libel filed; seizure effected; pending.
2816	90 barrels of vinegar	New Hampshire	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1618.)
2818	150 cases of fruit pudding	Massachusetts	Misbranded	Libel filed; seizure effected; pending.
2819	24 cases of coffee essence	Pennsylvania, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1189.)
2825	4 barrles of condensed milk	Virginia, eastern district	Adulterated	Decree of condemnation.
2827	75 barrels of vinegar	Massachusetts	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1884.)
2831	2 barrels of pepper	New Jersey	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1564.)
2832	35 barrels of vinegar	Iowa, southern district	do	Judgment of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1547.)
2833	90 barrels of vinegar	Connecticut	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1553.)
2835	750 cases, 250 cases, and 50 cases of sorghum sirup.	Missouri, western district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1579.)
2836	1 barrel of maraschino cherries	Minnesota	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1771.)
2840	10 barrels of cider vinegar	Colorado	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1590.)
2841	30 bags of figs	Pennsylvania, eastern district.	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1246.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
2843	80 barrels of cider vinegar	Iowa, southern district	Adulterated and misbranded.	Judgment of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1546.)
2845	6 barrels of vinegar	Rhode Island	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1941.)
2846	60 barrels of vinegar	Connecticut	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1555.)
2851	20 packages of herring	Pennsylvania, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1260.)
2852	15 cases of maraschino cherries	District of Columbia	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1370.)
2857	3 bags of dried apples	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1369.)
2862	50 barrels of vinegar	Connecticut	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1554.)
2865	1 barrel of dried cherries	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1333.)
2872	2 barrels of condensed milk	Virginia, eastern district	Adulterated and misbranded.	Goods not found.
2874	10 boxes of macaroni	Maryland	Misbranded	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1374.)
2875	1 case of cheese	Missouri, western district	do	Decree of condemnation and forfeiture; goods ordered sold. Notice of Judgment No. 1899.)
2876	4 cases of saffron	New York, southern district	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1288.)
2877	15 cases of cherries	Missouri, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1620.)
2878	15 cases of macaroni	Maryland	Misbranded	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1368.)
2879	30 cases, 75 cases, 40 cases, and 10 barrels of maraschino cherries.	Missouri, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1580.)
2880	614 pockets of rice	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1177.)
2881	30 cases of maraschino cherries	Missouri, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1585.)
2882	2 bags of dried apples	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1330.)
2887	150 cheeses	Florida, northern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1468.)
2888	70 tons of meat, 14 cases of oysters, 237 cases of sausage, and 52 quarters of beef.	Alaska	Adulterated	Decree of condemnation and forfeiture as to part of goods; released under bond. (Notice of Judgment No. 1476.)

2889	38 boxes of cheese	Georgia, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1494.)
2890	6 cases of champagne	Missouri, eastern district	do	Libel filed; seizure effected; pending.
2897	99 boxes of cheese	Georgia, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1479.)
2898	150 boxes of cheese	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1720.)
2899	100 cheeses	Florida, northern district	do	Libel filed, seizure effected; pending.
2905	12 cases of cherries	New York, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1591.)
2906	100 boxes of cheese	Georgia, southern district	do	Goods not found.
2907	125 boxes of cheese	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1519.)
2911	20 boxes of cheese	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1473.)
2912	45 cases of condensed milk	Texas, northern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1865.)
2914	125 boxes of cheese	Georgia, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1470.)
2915	75 barrels of vinegar	Indiana	Adulterated	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1890.)
2916	80 barrels of vinegar	Minnesota	Misbranded	Goods not found.
2917	50 barrels of vinegar	do	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond.
2921	18 boxes of cheese	Tennessee, middle district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1384.)
2926	100 boxes of cheese	Georgia, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1467.)
2927	125 boxes of cheese	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1594.)
2928	28 cases of maraschino cherries	Minnesota	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1731.)
2935	73 boxes of cheese	Georgia, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1493.)
2940	25 pails of pie filling	Louisiana, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1595.)
2941	1 barrel of jelly beans	Missouri, eastern district	Adulterated	No action taken.
2944	117 cheeses	Georgia, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1492.)
2945	48 cheeses	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1460.)
2946	100 single cheeses and 15 twin cheeses	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1472.)
2947	3 barrels of maraschino cherries	Michigan, eastern district	Adulterated and misbranded.	Libel filed; goods not found.
2948	6 cases of chocolate pecan fudge and 5 cases of peach creams.	Missouri, eastern district	Misbranded	Libel filed; dismissed.
2949	45 cheeses	Georgia, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1491.)
2950	7 dozen jars of "Kintho Beauty Cream."	Minnesota	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1379.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
2951	8 small jars and 45 large jars of "Kintho Beauty Cream."	Minnesota	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1379.)
2952	18 jars of "Kintho Beauty Cream"	do	do	Do.
2953	249 jars of "Kintho Beauty Cream"	do	do	Do.
2954	122 small jars "Kintho Beauty Cream"	do	do	Do.
2957	60 barrels of vinegar	South Dakota	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1627.)
2958	155 boxes of cheese	Georgia, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1459.)
2960	125 boxes of cheese	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1456.)
2961	50 boxes of cheese	do	do	Do.
2964	6½ dozen jars of Berry's freckle ointment.	Minnesota	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1376.)
2965	18 jars of Berry's freckle ointment	do	do	Do.
2966	84 jars of Berry's freckle ointment	do	do	Do.
2967	75 boxes of macaroni and spaghetti	Ohio, southern district	do	Decree of condemnation and forfeiture; goods relaesed under bond. (Notice of Judgment No. 1412.)
2971	7 cases of maraschino cherries	Minnesota	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1327.)
2978	135 boxes of cheese	New York, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1387.)
2979	1 barrel of raw linseed oil	Kansas	do	Decree of condemnation and forfeiture.
2981	85 boxes of cheese	Georgia, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1458.)
2982	5 cases of "Picadilly Dry Gin"	Illinois, northern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1347.)
2985	160 bottles of Cream of Hops	Iowa, southern district	do	Decree of condemnation, forfeiture, and distruction. (Notice of Judgment No. 1420.)
2986	425 bottles of Hop Tonic	do	do	Do.
2991	100 barrels of vinegar	Minnesota	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1829.)
2992	200 barrels of vinegar	do	do	Libel filed; dismissed; goods not found.
2993	70 barrels of vinegar	Michigan, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1597.)
2994	204 boxes of cheese	South Carolina	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1344.)
2995	52 cases and 12 cases of maraschino cherries.	Louisiana, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1775.)
2996	9 cases of cherries	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1732.)
2997	700 cases of breakfast food	New York, southern district	Misbranded	Goods not found.

2998	28 boxes of cheese	Kentucky, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1421.)
2999	1 barrel of candy	Missouri, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1708.)
3000	65 boxes of cheese	Georgia, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1457.)
3001	17 bags of rice	Kentucky, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1340.)
3003	1 barrel of cordial	Louisiana, eastern district	Adulterated and misbranded.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1598.)
3004	12 bags of chestnuts	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1378.)
3015	75 barrels of vinegar	Iowa, northern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1441.)
3016	1 barrel of beef, iron, and wine	Maryland	Misbranded	Decree of condemnation and forfeiture; goods ordered sold (Notice of Judgment No. 1474.)
3017	106 pails of fish	Georgia, southern district	do	Libel filed; pending.
3018	300 cases sorghum and corn sirup	Illinois, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1475.)
3019	25 cases of Temperance Beverage	do	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1599.)
3020	30 barrels of oysters	Pennsylvania, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1380.)
3021	10 barrels of oysters	do	do	Do.
3028	7 cases of maraschino cherries	Missouri, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture. (Notice of Judgment No. 1572.)
3029	do	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1573.)
3030	30 cases of maraschino cherries	Tennessee, middle district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1383.)
3031	170 cases of evaporated milk	Washington, eastern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1496.)
3034	600 cases of evaporated milk	California, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1879.)
3035	20 cases of maraschino cherries	Washington, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1721.)
3039	30 cases of maraschino cherries	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1722.)
3041	400 cases of canned tomatoes	Virginia, eastern district	do	Order of court holding goods misbranded releasing same and directing respondent to pay costs.
3042	410 cans of tomato pulp	Ohio, northern district	Adulterated	Decree of condemnation, forfeiture, and destruction.
3043	68 cases of "Dutch Rusk"	New York, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1415.)
3053	27 containers of sirup	Pennsylvania, eastern district	Adulterated and misbranded.	Libel filed; court refused to issue process.
3055	4 cases and 2 cases of maraschino cherries.	Missouri, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1574.)
3056	150 cases of canned peas	Kansas	Misbranded	Libel filed; pending.
3057	25 cases of candy	Missouri, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1506.)
3059	44 pails and 4 kegs of confectionery	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1733.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
3061	7 bags of chestnuts	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1375.)
3064	20 cases and 25 cases of molasses	Arizona	Misbranded	Decree of condemnation and forfeiture; goods released under bond.
3068	100 cases of tomato pulp	New York, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1463.)
3069	350 cases of tomato pulp	do	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1462.)
3077	5 bags of chestnuts	Maryland	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1723.)
3082	10 cases of macaroni	Massachusetts	Misbranded	Decree of condemnation and forfeiture. Goods ordered sold. (Notice of Judgment No. 1643.)
3083	6 cases of macaroni	do	do	Do.
3087	68 pails of candy	Minnesota	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1734.)
3088	25 cases of confectionery	Missouri, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1518.)
3093	20 dozen packages of peroxide of hydrogen.	Michigan, western district	Adulterated and misbranded.	Libel filed; pending.
3094	25 bags of chestnuts	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction.
3104	16 cases and 8 drums of powdered cocoa.	Texas, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1588.)
3105	73 barrels of tomato pulp	Pennsylvania, eastern district	Adulterated	No action taken; goods not found.
3106	75 barrels of vinegar	Indiana	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1889.)
3113	330 cans of tomato pulp	Ohio, northern district	Adulterated	Decree of condemnation, forfeiture, and destruction.
3118	1 barrel of oysters	District of Columbia	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1791.)
3119	135 cases of tomato pulp	New York, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1437.)
3120	40 boxes of macaroni	West Virginia, southern district	Misbranded	Libel filed; seizure effected.
3121	30 cheeses	do	do	Do.
3122	100 cases of tomato pulp	New York, southern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1586.)
3123	416 cases of tomato pulp	do	do	Do.
3124	100 cases of tomato pulp	do	do	Do.
3125	do	do	do	Do.
3126	734 cases of tomato pulp	do	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1587.)
3127	500 crates of tomato pulp	do	do	Proceedings discontinued and goods ordered released. (Notice of Judgment No. 1619.)

3137	12 cases of "Lemos"	District of Columbia	do.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1413.)
3138	25 barrels of vinegar	Wisconsin, eastern district	Adulterated and misbranded.	Libel filed; goods seized; pending.
3139	75 barrels of vinegar	do.	do.	Do.
3140	do.	Iowa, northern district	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1441.)
3141	100 barrels of vinegar	Minnesota	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1822.)
3142	do.	do.	do.	Do.
3143	19 barrels of vinegar	West Virginia, southern district	do.	Libel filed; seizure effected; pending.
3145	30 half barrels of vinegar	Michigan, eastern district	do.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1786.)
3155	50 bags of "Mixfeed"	Georgia, southern district	do.	Libel filed; seizure effected; pending.
3156	1 case of sauterne, 2 cases of Moselle, and 4 cases of Burgundy.	Washington, eastern district	Misbranded	Do.
3157	5 cases of sauterne and 5 cases of Moselle	do.	do.	Do.
3160	50 cases of tomato ketchup	Kentucky, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1719.)
3161	110 cases of rice	West Virginia, southern district	do.	Libel filed; seizure effected; pending.
3162	7 barrels of cream of hops	Iowa, southern district	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1841.)
3164	1 keg of extract of vanilla	Michigan, eastern district	Adulterated and misbranded.	Libel filed; proceedings discontinued.
3165	1,000 cases of canned tomatoes	District of Columbia	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1371.)
3167	3 barrels of "Beaufont Sarsaparilla"	do.	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1466.)
3175	280 cases of macaroni	Washington, western district	do.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1611.)
3176 3177	50 cases of "Sodarine"	Tennessee, western district	do.	Proceedings dismissed by order of court. (Notice of Judgment No. 1610.)
3178	25 cases of maraschino cherries	Missouri, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture. (Notice of Judgment No. 1575.)
3179	200 kegs of cordial	do.	do.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1902.)
3181	10 cases of "Buchu Gin"	Maryland	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1480.)
3182	900 cases of tomato pulp	Missouri, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1532.)
3184	300 cases of tomato pulp	New York, southern district	do.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1669.)
3185	500 cases of tomato pulp	Louisiana, eastern district	do.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1715.)
3186	150 cheeses	West Virginia, southern district	Misbranded	Libel filed; seizure effected; pending.
3187	20 cases of maraschino cherries	Kansas	do.	Do.
3188	6 cans of frozen eggs	New York, southern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1630.)
3189	65 barrels of vinegar	Iowa, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1550.)
3190	173 crates of tomato catsup	Missouri, eastern district	do.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1716.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article	Judicial district.	Charge.	Disposition or present status of case
3195	75 sacks of stock food	Georgia, northern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released upon payment of costs. (Notice of Judgment No. 1951.)
3199	6 dozen bottles of "Oriental Cream"	Wisconsin, eastern district	Misbranded	Libel filed; seizure effected; pending.
3200	15,000 bushels of wheat	Ohio, northern district	Adulterated	Libel filed; seizure effected.
3201	200 cases of "Cromarty Bloaters"	Maryland	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1443.)
3202	18 barrels of catsup	Georgia, northern district	Adulterated	Libel filed; seizure effected; pending.
3203	100 cases of catsup	do	do	Do.
3204	21 cases of Frutena	New Jersey	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1603.)
3205	400 cases of tomato pulp	New York, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1396.)
3209	540 cases of bottled water	Louisiana, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1802.)
3212	2 barrels of shucked oysters	District of Columbia	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1741.)
3216	325 cases of tomato pulp	Louisiana, eastern district	do	Libel filed; seizure effected; pending.
3225	2 barrels of cordial	District of Columbia	Adulterated and misbranded.	Do.
3226	5 cases of apples	do	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1416.)
3230	26 cases of mustard	Minnesota	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1419.)
3231	1,407 cases of canned milk	Washington, western district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1717.)
3232	100 bags of rice	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1388.)
3234	2 barrels of shelled oysters	District of Columbia	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1481.)
3235	2 barrels of shucked oysters	do	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1718.)
3236	150 bags of rice	West Virginia, southern district	Misbranded	Libel filed; pending.
3237	80 cases of tomatoes	Georgia, southern district	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1482.)
3238	252 sacks of cottonseed hulls	Georgia, northern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1656.)
3239	18 half barrels of catsup	do	Adulterated	Libel filed; seizure effected; pending.
3248	400 barrels of vinegar	Minnesota	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1831.)
3252	33 bags and 15 bags of peanuts	Illinois, northern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1372.)

3253	2 sacks of oysters	District of Columbia	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1604.)
3257	12 dozen bottles of tomato catsup	do	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1714.)
3260	100 kegs of fish	South Carolina	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1411.)
3261	60 cases of eggs	Massachusetts	Adulterated	Libel filed; seizure effected; pending.
3262	90 barrels tomato catsup	do	do	Do.
3263	500 cases of tomato pulp	Louisiana, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1793.)
3264	228 cases of tomato catsup	Missouri, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1709.)
3265	36 bottles of London Dry Gin	Pennsylvania, eastern district	Misbranded	Libel filed; seizure effected; pending
3276 3277 3278	677 cases of tomato pulp	Missouri, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1533.)
3282	36 barrels, 25 half barrels, and 13 kegs of catsup.	Georgia, northern district	do	Libel filed; seizure effected; pending.
3287	4 cases and 50 bottles of Londonderry Lithia Water.	District of Columbia	Misbranded	Do.
3288	840 cases of tomato catsup	Missouri, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1534.)
3294	4 barrels of compound catcup	District of Columbia	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1724.)
3298	700 bushels of oysters	do	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1794.)
3300	18 barrels of shelled oysters	do	do	Libel filed; goods not found.
3306 to 3311	510 barrels and 1,400 cans of tomato pulp.	Illinois, northern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1607.)
3313	1 barrel of turpentine	Missouri, eastern district	Adulterated and misbranded.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1608.)
3323	12 cans of honey	Pennsylvania, eastern district	do	Libel filed; seizure effected; pending.
3329	11 quarts and 20 pints of sparkling Burgundy wine.	District of Columbia	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1726.)
3331	87 barrels of catsup	Pennsylvania, eastern district	Adulterated	Goods not found.
3332	175 cases of tomato pulp	Louisiana, eastern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1632.)
3333	148 cases of tomato purée	Ohio, southern district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1633.)
3336	4 barrels of wine	Oregon	Misbranded	Libel filed; goods not found.
3337	9 barrels of wine	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1887.)
3342a	25 bags Chinese walnuts	Kansas	Adulterated	Libel filed; seizure effected; pending.
3342	225 bags Chinese walnuts			
3343	400 cases "4,800 cans" of tomato purée.	Pennsylvania, eastern district	do	Do
3344	140 cases of tomato pulp	Louisiana, western district	do	Judgment of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1785.)
3345 3346 3347	810 cases of tomato pulp	Missouri, eastern district	do	Decrees of condemnation, forfeiture, and destruction. (Notices of Judgment Nos. 1710, 1711, and 1712.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
3348	23 cases of Kneipp Malt Coffee	Maryland	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1727.)
3349	90 barrels of bottled Digesto Malt Extract.	California, northern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1908.)
3354	6 crates of frozen eggs	New Jersey	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1705.)
3355	650 cases of evaporated milk	Missouri, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1699.)
3356	121 cans of cooked peaches	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1735.)
3357	60 bottles of brandy	Pennsylvania, eastern district	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1530.)
3358	100 boxes of macaroni	Tennessee, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1806.)
3359	650 packages of catsup	Oregon	Misbranded	No action taken.
3360 3361	4 cases of sparkling burgundy	District of Columbia	do	Libel filed; seizure effected; pending.
3362	10 barrels of "Nutromalt"	Tennessee, western district	do	Do.
3363	25 bags of German grits	Illinois, northern district	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1612.)
3364	25 boxes of cheese	do	Adulterated	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1723.)
3365	12 cases of wine	Missouri, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond (Notice of Judgment No. 1913.)
3366	50 cases of lima beans	Kansas	Misbranded	Libel filed; seizure effected; pending.
3367	50 crates of tomato catsup	District of Columbia	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1729.)
3368	200 cases of pears	Oklahoma, western district	Misbranded	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1914.)
3369	75 cases of tomato catsup	Tennessee, western district	Adulterated	Libel filed; seizure effected; pending.
3370	400 jacket cans of sirup	California, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond.
3371	550 cases of canned goods	West Virginia, southern district	Misbranded	Libel filed; seizure effected; pending.
3372	8 barrels and 25 cases of wine	Nebraska	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1649.)
3373	94 cases of cove oysters	Oklahoma, eastern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1770.)
3374	250 cases of macaroni	District of Columbia	Misbranded	Libel filed; seizure effected; pending.
3376	45 cases of cove oysters	Tennessee, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond.
3380	20 cases of egg noodles	District of Columbia	do	Libel filed; pending.
3381	50 cases of oysters	Tennessee, eastern district	do	Decree of condemnation and forfeiture; goods released under bond.

3383	1 keg of vanilla extract	Pennsylvania, middle district	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1807.)
3385	1 barrel of vanilla extract	Pennsylvania, western district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1764.)
3387	25 barrels of tomato catsup	Louisiana, eastern district	do	Libel filed; pending.
3388	5 barrels of catsup	do	do	Do.
3390	90 boxes of macaroni	Connecticut	Misbranded	Libel filed; seizure effected; pending.
3391	116 cases of macaroni	do	do	No action taken.
3393	2 barrels of fish	Alabama, middle district	Adulterated	Libel filed; pending.
3394	750 cases of canned plums	Kansas	Misbranded	Decree filed.
3395	30 jugs of Orangeade sirup	District of Columbia	Adulterated	Libel filed; pending.
3397	64 cases of canned oysters	Colorado	Adulterated and misbranded.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1699.)
3398	67 cheeses	Tennessee, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond.
3399	36 cases of sirup	Nebraska	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1613.)
3400	100 cases of tomato catsup	Louisiana, eastern district	Adulterated	Libel filed; pending.
3401	150 cases of tomato catsup	do	do	Do.
3402	15 barrels and 15 half barrels of vinegar	Tennessee, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1915.)
3403	1 barrel of paprika	Texas southern district	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1614.)
3406	9 barrels of bottled vinegar	Illinois, southern district	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1682.)
3407	150 cases of oysters	Tennessee, eastern district	do	Judgment of condemnation and forfeiture; goods released under bond.
3411	43 barrels and 14 cases of candy	Missouri, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1634.)
3417	10 barrels of vinegar	Illinois, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1683.)
3418	36 cases of canned soaked peas	Colorado	Misbranded	Decree of condemnation and forfeiture; goods ordered sold or destroyed. (Notice of Judgment No. 1700.)
3431	60 cans of Lucca olive oil	District of Columbia	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1697.)
3432	56 cases of canned milk	Washington, western district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1528.)
3433	52 barrels of sugar vinegar	Illinois, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture.
3434	375 cases of canned salmon	Colorado	Misbranded	Decree of condemnation and forfeiture; goods released under bond.
3443	1 barrel of linseed oil	Kansas	Adulterated and misbranded.	Order for decree by default.
3454	9 barrels and 3 half barrels of vinegar	Texas, western district	do	Goods not found.
3457	27 barrels and 3 half barrels of vinegar	do	do	Do.
3458	8 cases of tea	Tennessee, middle district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1916.)
3459	18 cheeses	Tennessee eastern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1917.)
3460	15 cases of malt breakfast food	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1650.)
3461	4 cases of malt breakfast food	do	do	Do.
3463	1,000 cases of sugar corn	Missouri, western district	do	Decree of condemnation and forfeiture; goods released under bond (Notice of Judgment No. 1740.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at the close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
3465	190 cases of compound corn sirup	Kentucky, western district	Misbranded	Decree of condemnation and forfeiture; goods released under bond (Notice of Judgment No. 1789.)
3466	22 sacks of rice	Washington, eastern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1635.)
3467	4 bags of dried blackberries	Pennsylvania, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction.
3468	34 cheeses	Tennessee, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1918.)
3474	153 cases of canned salmon	Virginia, eastern district	Adulterated and misbranded.	Libel filed; pending.
3475	4 cases of honey	Pennsylvania, eastern district	do	Do.
3476	2 cases of honey	do	do	Do.
3477	3 cases of honey	do	do	Do.
3479	1 keg of banana cordial	District of Columbia	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1523.)
3480	345 cases of tomato catsup	New York, western district	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1838.)
3481	46 bags of head rice and 25 bags of fancy head rice.	Tennessee, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond.
3482	93 cases of peas	Missouri, eastern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1685.)
3483	18 cases of peas	do	do	Do.
3489	7 cases of macaroni and spaghetti	Wisconsin, eastern district	do	Goods not found.
3490	21 barrels of vinegar	Minnesota	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1832.)
3491	25 cases of ginger champagne	New York, southern district	do	Libel filed; pending.
3495	6 cases of honey	Pennsylvania, eastern district	Adulterated and misbranded.	Do.
3501	550 bushels of oysters in shells	District of Columbia	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1615.)
3502	750 bushels of oysters in shell	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1616.)
3503	100 half barrels of apple base cider	Texas, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1775.)
3504	100 kegs of apple cider	Texas, northern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1880.)
3505	25 boxes of light skim cheese	District of Columbia	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1739.)
3507	900 cases of salmon	Minnesota	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1651.)
3515	80 barrels of vinegar	Illinois, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1524.)

3528	90 barrels of cider vinegar	Pennsylvania, middle district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1676.)
3529	60 barrels of cider vinegar	do	do	Do.
3530	90 barrels of cider vinegar	do	do	Do.
3531	70 barrels of cider vinegar	do	do	Do.
3532	100 barrels of cider vinegar	do	do	Do.
3533	90 barrels of cider vinegar	do	do	Do.
3537	25 boxes of cheese	District of Columbia	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1525.)
3538	10 barrels of dried egg butter	New York, southern district	Adulterated	Libel filed; seizure effected; pending.
3539	63 barrels of sugar vinegar	Illinois, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1617.)
3541	5 bags of walnuts	District of Columbia	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1565.)
3548	300 boxes of Cromarty bloaters	New York, southern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1621.)
3557	3 barrels of witch hazel	Ohio, southern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1850.)
3581	55 pails and 25 kegs of fish	Kentucky, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1696.)
3582	450 bushels of oysters in shells	District of Columbia	Adulterated	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1566.)
3592	90 crates of tomato catsup	Illinois, southern district	do	Decree of condemnation, forfeiture, and destruction.
3595	do	do	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1725.)
3596	88 Daisy cheeses	Kentucky, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1836.)
3597	50 cases of clams	New York, northern district	do	Decree of condemnation and forfeiture; goods released under bond.
3600	10 boxes of dried eggs	do	Adulterated	Decree of condemnation, forfeiture, and destruction.
3602	55 barrels of vinegar	Nebraska	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1652.)
3606	500 cans of frozen eggs	Massachusetts	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1636.)
3607	100 boxes of cheese	Kentucky, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1837.)
3612	9 cases of liqueur	New Jersey	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1704.)
3613	957 cases of sweet corn	Missouri, western district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1903.)
3614 to 3618	524 cases of tomato catsup	New York, western district	Adulterated and misbranded.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1820.)
3619	3 barrels of dried eggs	New York, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1637.)
3620	25 cases of shredded coconut	Pennsylvania, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1766.)
3621	4 barrels of liqueur	New Jersey	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1703.)
3622	200 bushels of oysters	District of Columbia	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1527.)
3625	210 cases of sirup	Idaho	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1873.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
3627	5 barrels of tomato catsup	New Jersey	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1872.)
3628	15 boxes of dried eggs	New York, northern district	....do	Decree of condemnation, forfeiture, and destruction.
3630	10 cases of maraschino cherries	Pennsylvania, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1815.)
3632	57 cases of canned lima beans	Massachusetts	....do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1638.)
3633	11 barrels of vinegar	Kentucky, eastern district	Adulterated and misbranded.	Libel filed; pending.
3639	500 cases of tomato catsup	Missouri, western district	Adulterated	Do.
3646	15 kegs of cider	Kentucky, eastern district	Adulterated and misbranded.	Do.
3647	23 cans of oil	Rhode Island	Adulterated	Decree of condemnation and forfeiture; goods ordered sold or destroyed.
3784	400 cases of cove oysters	Missouri, western district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1904.)
3785	20 cans of olive oil	Rhode Island	Adulterated	Decree of condemnation and forfeiture; goods ordered sold or destroyed.
3787	30 cases of Grenadine sirup	Massachusetts	Adulterated and misbranded.	Libel filed; pending.
3789	200 barrels of chicory	Louisiana, eastern district	....do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1828.)
3797	23 cases of canned lima beans	Massachusetts	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1688.)
3802	20 barrels of vinegar	Illinois, eastern district	....do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1824.)
3809	300 sacks of cottonseed feed meal	Missouri, western district	....do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1886.)
3811	5 cases of butter	New York, eastern district	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1925.)
3820	1 keg of vanilla extract	Louisiana, eastern district	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1801.)
3821	65 cases of mustard	Minnesota	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1814.)
3822	166 packages of butter	New York, southern district	Adulterated	Libel filed; dismissed; goods seized by Board of Health of New York City.
3829	1,000 cases of prunes	Massachusetts	....do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1825.)
3837	9 cases of Ferro China Bisleri and 11 cases of Fernet Branca.	Pennsylvania, western district	Adulterated and misbranded.	Libel filed; pending.
3838	10 barrels of tomato catsup	Massachusetts	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1826.)

3842	2½ barrels peach and cherry cordial	District of Columbia	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1877.)
3869	71 barrels of vinegar	Kentucky, eastern district	do	Libel filed; pending.
3873	50 cases of canned peas	Massachusetts	Misbranded	Decree of condemnation and forfeiture; goods released under bond.
3881	20 cases of olive oil	Ohio, southern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1868.)
3883	102 cases of olive oil	Colorado	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1819.)
3884	1 barrel of distilled witchhazel	Maryland	Adulterated and misbranded.	Decree of condemnation, forfeiture, and destruction.
3885	200 cases of tomatoes	Louisiana, western district	Misbranded	Libel filed; pending.
3894	1,000 cases of Cuba sugar corn	Georgia, northern district	do	Do.
3895	2 cases of Vodka Monople	Pennsylvania, eastern district	Adulterated and misbranded.	Do.
3896	1 case of Vodka Monople	do	do	Do.
3898	100 cases of compound preserves and jam.	Minnesota	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1756.)
3914	5 boxes of prunes	Maryland	Adulterated	Decree of condemnation, forfeiture, and destruction.
3920	100 bales of hay	Alabama, southern district	Adulterated and misbranded.	Decree of condemnation, forfeiture, andd estruction. (Notice of Judgment No. 1813.)
3921	2 barrels of clams in shell	District of Columbia	Adulterated	Goods not found.
3925	12 baskets of cheese	Colorado	do	Libel filed; pending.
3932 3933 3934 3935 3936	5 barrels peach-flavored cordial	District of Columbia	Adulterated and misbranded.	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1755.)
3937	100 quart bottles of Pan Dandy Banana Brandy and 100 quart bottles of Pan Dandy Apricot Brandy.	Alabama, northern district	do	Libel filed; pending.
3939	3 half barrels so-called Banana Cordial.	Alabama, middle district	do	Do.
3940	60 bags chicory	Missouri, eastern district	Adulterated	Do.
3941	5 barrels of clams in shells	District of Columbia	do	Goods not found.
3948	132 cans of Lucca oil	Pennsylvania, eastern district	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1821.)
3952	25 cases Scuppernong wine	Michigan, eastern district	Adulterated and misbranded.	Libel filed; pending.
3967	100 bales of hay	Virginia, eastern district	Adulterated	Do.
3970	2 barrels of Atlas carbonated soda (bottled).	Pennsylvania, western district	Adulterated and misbranded.	Do.
3971	do	do	do	Do.
3974	5 barrels of Temperance tonic	do	do	Do.
3979	17 cases of mince meat	Missouri, eastern district	Misbranded	Do.
3981	79 cases of macaroni	District of Columbia	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1811.)
4002	4 cases of Greek candy	Illinois, northern district	do	Libel filed; pending.
4003	150 cases of succotash	New Jersey	do	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1869.)
4004	146 cheeses	Georgia, southern district	Adulterated	Libel filed; pending.
4012	13 crates of frozen eggs	New York, southern district	do	Do.

Cases under section 10 of the food and drugs act of June 30, 1906, reported during the fiscal year 1912, and finally determined during the year or pending in the courts at its close—Continued.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
4013	3 sacks of ground compound roasted coffee.	Pennsylvania, eastern district	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1833.)
4014	3 barrels of bottled Atlas carbonated soda.	Pennsylvania, western district	Adulterated and misbranded.	Goods not found.
4016	10 barrels of vinegar	Massachusetts	do	Libel filed; pending.
4017	15 cases Litthauer Stomach Bitters	New Jersey	Misbranded	Do.
4020	19 barrels of fruit juice	New York, southern district	do	Do.
4021	3 barrels of olive oil	Massachusetts	Adulterated	Do.
4022	2 cases of olive oil	do	Adulterated and misbranded.	Do.
4028 4029 4030 4031 4032 4033	100 cases of canned crushed oranges	District of Columbia	do	Do.
4038	1 barrel and 4 half barrels of Dixie New Orleans molasses.	do	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1835.)
4045	60 barrels of bottled beer	Georgia, southern district	Adulterated and misbranded.	Libel filed; pending.
4051	25 cases of canned peas	Illinois, northern district	do	Do.
4053	25 cases of grits	Alabama, southern district	Misbranded	Do.
4055	25 cases of rasberry vinegar	Pennsylvania, eastern district	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1871.)
4057	17 cheeses	Kentucky, western district	do	Libel filed; pending.
4058	30 cases of canned corn	Kansas	do	Do.
4059	75 cases of tomato pulp	do	Adulterated and misbranded.	Do.
4060	75 cases of tomato product	Alabama, southern district	Adulterated	Do.
4123	100 cheeses	do	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1874.)
4124	50 cheeses	do	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1875.)
4125	5 cases Fernet L. Branca	Missouri, eastern district	do	Libel filed; pending.
4127	3 cases of confectionery	Illinois, northern district	do	Do.
4128	1 barrel of wild cherry cordial	New York, southern district	Adulterated and misbranded.	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1921.)
4142	1 barrel of olive oil	Rhode Island	Adulterated	Libel filed; pending.
4143	2 cases of olive oil	do	do	Do.
4147	76 mats of figs	Iowa, northern district	do	Do.
4148	25 cases of bottled tomato catsup	Kansas	Adulterated and misbranded.	Do.

4149	5 cases of apple brandy	Alabama, northern district	do	Goods not found.
4151	150 cases of canned succotash	New York, eastern district	Misbranded	Libel filed; pending.
4153	11 boxes of prunes	Maryland	Adulterated	Do.
4160	600 cases of bottled catsup	Missouri, western district	do	Do.
4163	7 bags of corn meal	Maryland	do	Do.
4165	286 sacks of horse feed	Louisiana, eastern district	do	Do.
4172	1,400 sacks of flour	Texas, western district	Misbranded	Do.
4175	16 pails of ground pepper	North Dakota	do	Do.
4176	46 sacks of herring	Pennsylvania, eastern district	Adulterated	Do.
4187	79 cases of champagne	New Jersey	Misbranded	Do.
4188	26 cases of sorghum syrup	Wyoming	do	Do.
4190	4 cases of olive oil	Pennsylvania, eastern district	Adulterated and misbranded.	Do.
4193	25 packages of compound fruit jam	Michigan, eastern district	do	Do.
4194	1 case of olive oil	Rhode Island	do	Do.
4195	do	do	do	Do.
4196	2 cases of olive oil	do	do	Do.
4204	100 cases of canned tomato pulp	New Jersey	Adulterated	Do.
4205	20 barrels of apple product	Georgia, northern district	Adulterated and misbranded.	Do.
4207	500 cases of canned evaporated milk	Iowa, southern district	Misbranded	Do.
4213	12 cases of jelly	Pennsylvania, eastern district	Adulterated and misbranded.	Do.
4215	517 cases of canned corn	Colorado	do	Do.

SUMMARY.

Decrees of condemnation and forfeiture; goods destroyed	103
Decrees of condemnation and forfeiture; goods released on bond	162
Decrees of condemnation; disposition of goods not reported	6
Decrees of condemnation; goods ordered to be sold	23
Seizure requested; goods not found	18
Court refused to issue process	1
Seizure effected; discontinued; goods released	4
Seizure effected; dismissed	1
Seizure effected; pending	150
Total	468

Cases reported for criminal prosecution under the food and drugs act, June 30, 1906, prior to the fiscal year 1912, and terminated during the fiscal year 1912.

F. & D. case No.	Defendant	Judicial district.	Nature of offense charged.	Disposition or present status of case.
6	Clark Coggan & Johnson Co.	Massachusetts	Shipment of misbranded coffee from Massachusetts to the District of Columbia.	Plea of nolo contendere; fined $50. (Notice of Judgment No. 1898.)
632	Perry-Taylor Drug Co.	Virginia, eastern district.	Shipment of adulterated and misbranded vanilla extract from Virginia to North Carolina.	Information filed; dismissed.
637	Von Bremen Mac-Monies & Co.	New York, southern district.	Shipment of adulterated and misbranded oil from New York to Texas.	Judgment for the United States reversed by the circuit court of appeals. (Notice of Judgment No. 1949.)
678	Parodi Ermino & Co.	do	Shipment of adulterated and misbranded gluten paste from New York to Colorado.	Plea of guilty by defendants; fined $25. (Notice of Judgment No. 1514.)
740	Figprune Cereal Co.	California, southern district.	Shipment of misbranded Figprune from California to New York.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1777.)
758	Potter Drug & Chemical Corporation.	Massachusetts	Shipment of misbranded Cuticura ointment from Massachusetts to the District of Columbia.	Information quashed. (Notice of Judgment No. 1691.)
762	do	do	do	Do.
767	do	do	Shipment of misbranded soap from Massachusetts to the District of Columbia.	Do.
784	John Morgan	New York, southern district.	Shipment of misbranded water from New York to New Jersey.	Action of lower court arresting judgment reversed by the Supreme Court; case remanded for sentence and judgment; defendants fined $50. (Notice of Judgment No. 1692).
795	Stern Hersh & Co.	Illinois, northern district.	Shipment of misbranded potato flour from Illinois to Wisconsin.	Information filed; discontinued.
829	Hecker-Jones-Jewell Milling Co.	New York, southern district.	Shipment of misbranded wheat flour from New York to North Carolina.	Nolle prossed.
863	Knickerbocker Chocolate Co.	do	Shipment of misbranded chocolate from New York to Pennsylvania.	Do.
933	M. C. Peters Mill Co.	Nebraska	Shipment of misbranded stock feed from Nebraska to Illinois.	Finding of not guilty by the court. (Notice of Judgment No. 1634.)
982	Hipolite Egg Co.	Missouri, eastern district.	Shipment of adulterated eggs from Missouri to Illinois.	Judgment by default; fined $100 and costs. (Notice of Judgment No. 1438.)
1017	Napa & Sonomo Wine Co.	California, northern district.	Shipment of misbranded wine from California to Colorado.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1417.)
1097	M. C. Peters Mill Co.	Nebraska	Shipment of adulterated and misbranded scratch feed from Nebraska to Illinois.	Finding of not guilty by the court. (Notice of Judgment No. 1654.)
1099	do	do	Shipment of misbranded stock feed from Nebraska to Georgia.	Do.
1111	do	do	Shipment of misbranded Arab horse feed from Nebraska to Georgia.	Finding of guilty by the court; fined $75 and costs. (Notice of Judgment No. 1654.)
1123	Hall-Baker Grain Co.	Missouri, western district.	Shipment of adulterated and misbranded wheat from Missouri to Texas.	Trial by jury; verdict guilty; fined $50 and costs; appeal to United States Circuit Court of Appeals; now pending. (Notice of judgment No. 1135.)
1131	Bendiner & Schlesinger.	New York, southern district.	Shipment of misbranded consumption cure from New York to New Jersey.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1551.)
1132	H. C. Keith	Indiana	Shipment of misbranded medicine from Indiana to the District of Columbia.	Grand jury failed to indict.

1133	tto Kuehne Pres. Co.	Kansas	Shipment of adulterated and misbranded vinegar from Kansas to New Mexico.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1852.)
1134	H. C. Keith	Indiana	Shipment of misbranded medicine from Indiana to the District of Columbia.	Grand jury failed to indict.
1158	Serafina Manfredonia	New York, southern district.	Shipment of adulterated olive oil from New York to Connecticut.	Nolle prossed.
1176	Zinkeisen & Co.	do	Shipment of adulterated and misbranded gum trajacanth from New York to New Jersey.	Do.
1214	Bettman Johnson Co.	Ohio, southern district	Shipment of adulterated and misbranded blackberry cordial from Ohio to California.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1440.)
1234	H. J. Heinz Co.	Pennsylvania, western district.	Shipment of adulterated and misbranded cider vinegar from Pennsylvania to New York.	Nolle prossed.
1283	Foote & Jenks	Michigan, eastern district.	Shipment of adulterated and misbranded lemon flavor from Michigan to Ohio.	Trial by jury; verdict of guilty; defendant's motion for a new trial denied; fined $100; defendant asks 90 days to settle bill of exceptions on appeal. (Notice of Judgment No. 1888.)
1294	Bettman Johnson Co.	Ohio, southern district	Shipment of adulterated and misbranded blackberry cordial from Ohio to Illinois.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1440.)
1327	Thomson & Taylor Spice Co.	Illinois, northern district.	Shipment of misbranded coffee from Illinois to Colorado	Finding of guilty by the court; fined $1. (Notice of Judgment No. 1823.)
1338	D. Auerbach & Sons	New York, southern district.	Shipment of adulterated and misbranded milk chocolate from New York to Colorado.	Trial by jury; acquittal. (Notice of Judgment No. 1803.)
1354	C. F. Sauer Co.	Virginia, eastern district.	Shipment of adulterated and misbranded spirits of niter from Virginia to New Jersey.	Nolle prossed.
1370	Sharp-Elliott Manufacturing Co.	Texas, western district.	Shipment of adulterated cider from Texas to Arizona	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1769.)
1382	Berry-Mayburn Co.	Illinois, northern district.	Ship of adulterated and misbranded molasses from Illinois to Arizona.	Information filed; stricken from docket.
1412	The Piso Co.	Pennsylvania, western district.	Shipment of misbranded cold medicine from Pennsylvania to Colorado.	Nolle prossed. (Notice of Judgment No. 1912.)
1422	St. James Society	New York, southern district.	Shipment of misbranded drug habit cure from New York to District of Columbia.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1291.)
1435	George D. Armstrong	New Hampshire	Shipment of adulterated milk from New Hampshire to Massachusetts.	Information filed; dismissed; defendant not found.
1438	W. E. Hopkins	do	do	Plea of guilty by defendant; fined $10; (Notice of Judgment No. 1935.)
1457	Philadelphia Pickling Co.	Pennsylvania, eastern district.	Shipment of misbranded catsup from Pennsylvania to New Jersey.	Trial by jury; verdict of guilty; fined $50 and costs. (Notice of Judgment No. 1690.)
1458	R. Hillier's Sons Co.	New York, southern district.	Shipment of adulterated and misbranded drug products from New York to California.	Plea of guilty by defendants; fined $50. (Notice of Judgment No. 1674; consolidated with F. & D. Nos. 1494 and 1564.)
1470	Berry-Maybrun Co.	Illinois, northern district.	Shipment of misbranded preserves from Illinois to South Dakota.	Information filed; stricken from docket.
1485	H. J. Heinz Co.	Pennsylvania, western district.	Shipment of adulterated and misbranded cider vinegar from Pennsylvania to Washington.	Nolle prossed.
1487	George W. Lake	New Hampshire	Shipment of adulterated milk from New Hampshire to Massachusetts.	Plea of nolo contendere by defendant; fined $10. (Notice of Judgment No. 1936.)
1489	Marchesini Bros.	New York, southern district.	Shipment of adulterated and misbranded olive oil from New York to Pennsylvania.	Trial by jury; verdict guilty; fined $300. (Notice of Judgment No. 1624.)
1492	Smith Bros. Co. (Ltd.)	Louisiana, eastern district.	Shipment of misbranded coffee from Louisiana to Texas	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1295.)
1494	R. Hillier's Sons Co.	New York, southern district.	Shipment of adulterated and misbranded henbane leaves from New Jersey to California.	Plea of guilty by defendant; fined $50; (Notice of Judgment No. 1674; consolidated with F. & D. Nos. 1458 and 1564.)

Cases reported for criminal prosecution under the food and drugs act, June 30, 1906, prior to the fiscal year 1912, and terminated during the fiscal year 1912—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
1524	Gilbert Bros. & Co.	Maryland	Shipment of adulterated and misbranded laudanum from Maryland to West Virginia.	Nolle prossed.
1525	S. J. Van Lill Co.	do	Shipment of misbranded apple jelly from Maryland to Ohio.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1393.)
1526	A. Sensoli	New York, southern district.	Shipment of adulterated and misbranded olive oil from New York to New Jersey.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1640.)
1539	Oil Importing Co.	Ohio, northern district.	Shipment of adulterated and misbranded olive oil from Ohio to Missouri.	Plea of guilty by defendant as to first count of information; fined $25 and costs; remaining counts of information nolle prossed. (Notice of Judgment No. 1501; consolidated with F. & D. No. 1715.)
1543	G. C. Hanford Manufacturing Co.	New York, northern district.	Shipment of misbranded balsam of myrrh from New York to Pennsylvania.	Information filed; continued without further action.
1544	do	do	Shipment of misbranded balsam of myrrh from New York to Illinois.	Do.
1547	Paola Manganelli	New York, southern district.	Shipment of adulterated and misbranded olive oil from New York to New Jersey.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1570.)
1560	A. H. Barber & Co.	Illinois, northern district.	Shipment of adulterated desiccated eggs from Illinois to Maryland.	Trial by court; defendant found guilty; fined $50. (Notice of Judgment No. 1834.)
1564	R. Hillier's Sons & Co.	New York, southern district.	Shipment of adulterated and misbranded drug products from New York to California.	Plea of guilty; fined $50. (Notice of Judgment No. 1674; consolidated with F. & D. Nos. 1458 and 1494.)
1566	California Fruit Canners Association.	California, northern district.	Shipment of adulterated and misbranded jam from California to Arizona.	Grand jury refused to indict.
1567	Bessire & Co.	Indiana	Shipment of misbranded tomato preserves from Indiana to Ohio.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1584.)
1581	Giuliana Grocery Co.	New Jersey	Shipment of adulterated and misbranded olive oil from New Jersey to New York.	Nolle prossed.
1585	Mohn Wine Co.	Michigan, western district.	Shipment of adulterated and misbranded grape juice from Michigan to Illinois.	Trial by jury; verdict not guilty by direction of court. (Notice of Judgment No. 1895.)
1587	V. Lopez & Co.	New York, southern district.	Shipment of adulterated and misbranded butter from New York to North Carolina.	Plea of guilty by defendant; fined $10; (Notice of Judgment No. 1556.)
1598	E. G. Lyons & Raas Co.	California, northern district.	Shipment of misbranded Creme de cacao from California to Arizona.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1247.)
1611	do	do	Shipment of misbranded champagne from California to Colorado.	Do.
1619	Peter N. Nikolopoulas.	Utah	Shipment of adulterated oil from Utah to Nevada	Trial by jury; verdict of not guilty. (Notice of Judgment No. 1698.)
1632	E. G. Lyons & Raas Co.	California, northern district.	Shipment of misbranded liqueur from California to Arizona.	Plea of guilty by defendant; fined $25.
1634	Eddy & Eddy Mfg. Co.	Missouri, eastern district.	Shipment of adulterated and misbranded vanilla extract from Missouri to Iowa.	Plea of nolo contendere by defendant; fined $2.
1645	American Cordial & Distilling Co.	California, northern district.	Shipment of misbranded "Vino Vito" from California to Arizona.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1215.)
1651	Interstate Chemical Co.	Maryland	Shipment of adulterated and misbranded laudanum from Maryland to North Carolina.	Nolle prossed.

1652	J. L. Stevens Co.	Ohio, southern district	Shipment of misbranded drug-habit cure from Ohio to the District of Columbia.	Trial by jury; verdict of guilty; fined $50. (Notice of Judgment No. 1891.)
1653	do	do	do	Do.
1654	Warner Safe Cure Co.	New York, western district.	Shipment of misbranded kidney and liver cure from New York to the District of Columbia.	
1668	Murray & Nickell Manufacturing Co.	Illinois, northern district.	Shipment of adulterated and misbranded drug product from Illinois to California.	Trial by jury; verdict of guilty; fined $50 and costs.
1673	do	do	do	Trial by jury; verdict of not guilty by direction of the court.
1682	Pacific Coast Syrup Co.	California, northern district.	Shipment of adulterated jelly from California to Nevada.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1742.)
1684	Schlesinger & Bender.	do	Shipment of adulterated and misbranded apricot brandy from California to Arizona.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1248.)
1685	Bettman Johnson Co.	Ohio, southern district	Shipment of misbranded champagne from Ohio to Missouri.	Plea of nolo contendere by defendant; fined $50 and costs. (Notice of Judgment No. 1653.)
1704	Wichita Vinegar Works.	Kansas	Shipment of misbranded jelly from Kansas to Oklahoma.	Plea of not guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1702.)
1715	Oil Importing Co.	Ohio, northern district	Shipment of adulterated and misbranded olive oil from Ohio to Missouri.	Plea of guilty by defendant as to first count of the information; fined $25 and costs; the remaining counts of information were nolle prossed. (Notice of Judgment No. 1501; consolidated with F. & D. No. 1539.)
1716	S. J. Van Lill Co.	Maryland	Shipment of misbranded preserves from Maryland to New York.	Plea of guilty by defendant; fined $30. (Notice of Judgment No. 1391.)
1718	J. F. Hancock & Son.	do	Shipment of misbranded drug from Maryland to Colorado.	Nolle prossed.
1720	Bettman Johnson Co.	Ohio, southern district	Shipment of misbranded wine from Ohio to Illinois.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of judgment No. 1452.)
1755	R. Hardesty Manufacturing Co.	Colorado	Shipment of adulterated and misbranded Oleo-de-Vanil from Colorado to Texas.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1557.)
1766	Dannemiller Coffee Co.	New York, eastern district.	Shipment of adulterated and misbranded coffee from New York to Virginia.	Plea of guilty by defendant to first count of information; fined $25; second count dismissed. (Notice of Judgment No. 1689.)
1780	Lexington Drug & Chemical Co.	New York, southern district.	Shipment of misbranded drug-habit cure from New York to Missouri.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1495; consolidated with F. & D. No. 1874.)
1790	Mississippi Cotton Oil Co.	Mississippi, northern district.	Shipment of misbranded cottonseed meal from Mississippi to Vermont.	Trial by jury; verdict of not guilty by direction of the court. (Notice of Judgment No. 1896.)
1802	Huntington Maple Syrup & Sugar Co.	Rhode Island	Shipment of adulterated and misbranded maple sirup from Rhode Island to Georgia.	Plea of nolo contendere by defendant; fined $20. (Notice of Judgment No. 1445.)
1806	Shephard Pharmacal Co.	New York, southern district.	Shipment of misbranded drug from New York to District of Columbia.	Plea of guilty by defendant; sentence suspended. (Notice of Judgment No. 1219.)
1811	Alart & McGuire.	New Jersey	Shipment of adulterated and misbranded catsup from New Jersey to Pennsylvania.	Plea of non vult to first count of information; fined $100; sentence suspended as to the other counts. (Notice of Judgment No. 1427; consolidated with F. & D. Nos. 1888 and 1937.)
1827	David B. Levy.	New York, southern district.	Shipment of adulterated and misbranded drug from New York to the District of Columbia.	Nolle prossed.
1837	Radio-Sulpho Co.	Colorado	Shipment of misbranded drug from Colorado to the District of Columbia.	Trial by jury; verdict of guilty; motion for new trial. (Notice of Judgment No. 1049.)
1857	Hazen & Morse.	New York, southern district.	Shipment of misbranded drug from New York to the District of Columbia.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1221.)
1865	Smith Bros.	Louisiana, eastern district.	Shipment of adulterated and misbranded coffee from Louisiana to Mississippi.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1295.)
1874	Lexington Drug & Chemical Co.	New York, southern district.	Shipment of misbranded drug-habit cure from New York to Missouri.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1495; consolidated with F. & D. No. 1780.)

Cases reported for criminal prosecution under the food and drugs act, June 30, 1906, prior to the fiscal year 1912, and terminated during the fiscal year 1912—Continued.

F. & D. case No.	Defendant.	Judicial district	Nature of offense charged.	Disposition or present status of case.
1876	Mayor Walnut Oil Co.	Missouri, western district.	Shipment of msbranded walnut oil from Missouri to Washington.	Case dismissed by order of court upon payment of costs. (Notice of Judgment No. 1677.)
1888	Alart & McGuire	New York, southern district.	Shipment of adulterated tomato catsup from New York to Pennsylvania.	Plea of non vult by defendant to first count of information; fined $100; sentence suspended on other counts. (Notice of Judgment No. 1427; consolidated with F. & D. Nos. 1811 and 1937.)
1897	Standard Syrup Co.	Ohio, northern district	Shipment of adulterated and misbranded maple sugar from Ohio to Michigan.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1502; consolidated with 1991.)
1926	Crist Kruse	Indiana	Shipment of adulterated milk from Indiana to Ohio	Trial by jury; verdict, guilty; fined $25 and costs. (Notice of Judgment No. 1559.)
1929	J. L. Hopkins & Co.	New York, southern district.	Shipment of adulterated and misbranded drug from New York to California.	Trial by jury; verdict of not guilty as to charge of misbranding; charge of adulteration dismissed. (Notice of Judgment No. 1881.)
1937	Alart & McGuire	New Jersey	Shipment of adulterated catsup from New York to Pennsylvania.	Plea of non vult by defendant to first count of information; fined $100; sentence suspended on other counts. (Notice of Judgment No. 1427; consolidated with F. & D. Nos. 1811 and 1888.)
1939	Bettman Johnson Co.	Ohio, southern district	Shipment of adulterated and misbranded ginger extract from Ohio to Texas.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1453.)
1942	Allan-Pfeiffer Chemical Co.	Missouri, eastern district.	Shipment of misbranded extract of damiana and saw palmetto from Missouri to Illinois.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1560.)
1948	Bettman Johnson Co.	Ohio, southern district	Shipment of adulterated and misbranded peppermint extract from Ohio to Texas.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1454.)
1953	E. G. Lyons & Raas Co.	California, northern district.	Shipment of adulterated and misbranded maraschino from California to Colorado.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1511.)
1954	Rheinstrom Bros.	Ohio, southern district	Shipment of adulterated and misbranded ginger extract and peppermint essence from Ohio to Texas.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1422.)
1962	Thomson & Taylor Spice Co.	Illinois, northern district.	Shipment of adulterated and misbranded coffee from Illinois to Colorado.	Nolle prossed.
1972	E. G. Lyons & Raas Co.	California, northern district.	Shipment of misbranded Orange Curacao from California to Utah.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1511.)
1977	Dr. David Kennedy Co.	New York, southern district.	Shipment of misbranded cherry balsam from New York to Massachusetts.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1234; consolidated with F. & D. Nos. 2222 and 2058.)
1991	Standard Syrup Co.	Ohio, northern district	Shipment of adulterated and misbranded sugar from Ohio to Michigan.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1502; consolidated with 1897.)
1994	Kansas City Conserve Co.	Missouri, western district.	Shipment of adulterated and misbranded tomato ketchup from Missouri to Oklahoma.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1405.)
1997	E. G. Lyons & Raas Co.	California, northern district.	Shipment of misbranded Creme de Menthe from California to Arizona.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1511.)
1998	do	do	Shipment of misbranded Jamaica rum from California to Colorado.	Do.
1999	Joseph P. Wilde	Pennsylvania, eastern district.	Shipment of misbranded mustard from Pennsylvania to New Jersey.	Trial by jury; verdict not guilty. (Notice of Judgment No. 1239.)

2023	Basilea & Calandra	New York, southern district.	Shipment of misbranded Orange Curacao from New York to New Mexico.	Plea of guilty by defendant; sentence suspended. (Notice of Judgment No. 1521.)
2041	Mexley Lemon Elixir Co.	Georgia, northern district.	Shipment of misbranded lemon elixir from Georgia to the District of Columbia.	Nolle prossed.
2043	Pioneer Preserving Co.	Missouri, western district.	Shipment of misbranded jam from Missouri to Kansas	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgement No. 1406.)
2044	Polk & Calder Drug Co.	New York, northern district.	Shipment of adulterated and misbranded flavoring extract from New York to Massachusetts.	Plea of guilty by defendant; fined $50.
2047	John Vittucci Co.	Washington, western district.	Shipment of adulterated and misbranded salad oil from Washington to Idaho.	Plea of guilty by defendant; fined $5 and costs. (Notice of Judgment No. 1713.)
2049	Star Wafer Co.	Oklahoma, western district.	Shipment of adulterated ice-cream cones from Oklahoma to Nebraska.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1301.)
2050	do	do	Shipment of adulterated ice-cream cones from Oklahoma to Texas.	Do.
2054	Pioneer Preserving Co.	Missouri, western district.	Shipment of misbranded jam from Missouri to Kansas	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1398.)
2058	Dr. David Kennedy Co.	New York, southern district.	Shipment of misbranded worm sirup from New York to Massachusetts.	Plea of guilty by defendant; fined $200 on second and third count of information; sentence suspended on the first count. (Notice of Judgment No. 1234; consolidated with F. & D. Nos. 2222 and 1977.)
2061	Bell Chemical Co.	do	Shipment of misbranded peroxide cream from New York to Massachusetrs.	Nolle prossed.
2071	B. T. Chandler & Son.	Illinois, northern district.	Shipment of adulterated and misbranded vinegar from Illinois to Indiana.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1349.)
2075	Norman Lichty Manufacturing Co.	Iowa, southern district.	Shipment of misbranded headache capsules from Iowa to Michigan.	Information filed; dismissed.
2096	Rex Extract Co.	New York, eastern district.	Shipment of misbranded vanilla-bean sugar from New York to Massachusetts.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1561.)
2098	Rosenblatt Co.	California, northern district.	Shipment of adulterated and misbranded essence of peppermint from California to Texas.	Plea of guilty by defendant; fined $100. (Notice of judgment No. 1230.)
2111	Mihalovitch Co.	Ohio, southern district.	Shipment of misbranded "Gold Medal Coffee Cocktail" from Ohio to Colorado.	Plea of nolo contendere by defendant; fined $10. (Notice of Judgment No. 1282.)
2112	Clark Coggin & Johnson Co.	Massachusetts	Shipment of misbranded coffee from Massachusetts to Wisconsin.	Nolle prossed.
2125	Tip Top Bottling Co	Missouri, eastern district.	Shipment of adulterated and misbranded sweet cider from Missouri to Illinois.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1362.)
2129	J. B. Edgar Grain Co.	Tennessee, western district.	Shipment of misbranded stock feed from Tennessee to Florida.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1847.)
2133	Hoffman Bros. Produce Co.	Missouri, eastern district.	Shipment of misbranded evaporated apples from Missouri to Alabama.	Plea of guilty by defendant; fined $10.
2134	Continental Cereal Co.	Illinois, southern district.	Shipment of misbranded gluten feed from Illinois to Indiana.	Plea of nolo contendre by defendant; fined $10. (Notice of Judgment No. 1293.)
2135	North-West Mills Co.	Minnesota	Shipment of misbranded dairy feed from Minnesota to Indiana.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1840; consolidated with F. & D. No. 2504.)
2145	Acme Extract & Chemical Works.	Pennsylvania, middle district.	Shipment of adulterated vanilla extract from Pennsylvania to the District of Columbia.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1292.)
2151	Innis, Speiden & Co.	New York, southern district.	Shipment of misbranded oil of cassia from New York to Massachusetts.	Nolle prossed.
2158	D. Morolatesi & Co.	do	Shipment of adulterated and misbranded drug from New York to New Jersey.	Plea of guilty by defendant; sentence suspended. (Notice of Judgment No. 1284.)
2162	Star Wafer Co.	Oklahoma, western district.	Shipment of adulterated ice-cream cones from Oklahoma to Texas	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1301.)

Cases reported for criminal prosecution under the food and drugs act, June 30, 1906, prior to the fiscal year 1912, and terminated during the fiscal year 1912—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
2200	East St. Louis Cotton Oil Co.	Illinois, eastern district.	Shipment of misbranded cottonseed meal from Illinois to Michigan.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1707.)
2209	H. A. Hayden........	District of Columbia..	Sale in the District of Columbia of adulterated oysters....	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1306.)
2213	Norway Pharmacal Co.	New York, southern district.	Shipment of misbranded drug from New York to Massachusetts.	Nolle prossed.
2218	Quaker Oats Co.......	Iowa, northern district.	Shipment of misbranded Victor feed from Iowa to Pennsylvania.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1694.)
2222	Dr. David Kennedy Co.	New York, southern district.	Shipment of misbranded Herculine tonic from New York to Massachusetts.	Plea of guilty by defendant; fined $100 on second and third count of information; sentence suspended on the first count. (Notice of Judgment No. 1234; consolidated with F. & D. Nos. 1977 and 2058.)
2225	Youngstown Macaroni Co.	Ohio, northern district.	Shipment of misbranded macaroni from Ohio to Pennsylvania.	Plea of guilty by defendant; fined $5; sentence suspended (Notice of Judgment No. 1503.)
2227	William H. Hayden...	District of Columbia..	Sale of adulterated oysters in the District of Columbia.....	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1332).
2229	L. Fagret Co..........	Maryland.............	Shipment of misbranded Hair Tonic from Maryland to the District of Columbia.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1673.)
2239	Schwabacher Bros. & Co.	Washington, western district.	Shipment of misbranded salad oil from Washington to Oregon.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1434.)
2240	Snell & Simpson......	Massachusetts.........	Shipment of misbranded "Figlettes" from Massachusetts to Rhode Island.	Plea of guilty by defendant, Simpson; fined $50; case nolle prossed as to defendant, Snell. (Notice of Judgment No. 1403.)
2243	Hearn Co.............	Maryland.............	Shipment of adulterated tomato pulp from Maryland to Pennsylvania.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1267.)
2245	Minuet Cordial Co.....	Missouri, western district.	Shipment of adulterated and misbranded Jamaica ginger from Missouri to Illinois.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1353.)
2246	Golden Gate Fruit Co.	New York, southern district.	Shipment of misbranded apricot brandy from New York to Texas.	Trial by jury; verdict not guilty by direction of the court. (Notice of Judgment No. 1577.)
2256	Kells Co.............	.....do...............	Shipment of misbranded drug product from New York to the District of Columbia............................	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1218.)
2275	Continental Cereal Co.	Illinois, southern district	Shipment of misbranded stock feed from Illinois to Indiana	Plea of nolo contendere by defendant; fined $10. (Notice of Judgment No. 1294.)
2276 to 2302	French Bros., Bauer Co.	Ohio, southern district.	Shipment of adulterated milk and cream from Ohio to Kentucky.	Trial by jury; verdict of guilty; fine of $270 and costs, amounting to $334.05. (Notice of Judgment No. 1892.)
2319	J. E. Fowler Co.......	Virginia, eastern district.	Shipment of adulterated and misbranded extract of nutmeg from Virginia to Mississippi.	Plea of nolo contendere by defendant; fined $20 and costs.
2323	James C. Bailey.......	District of Columbia..	Sale of adulterated oysters in the District of Columbia....	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1385).
2333	S. Hirsch Distilling Co.	Missouri, western district.	Shipment of adulterated and misbranded peppermint extract from Missouri to Illinois.	Plea of guilty by defendant; fined $50 and costs.
2353	J. B. Gruman Co......	New York, southern district.	Shipment of adulterated and misbranded turmeric from New York to Illinois	Nolle prossed.

2356	E. W. Oest Co.	California, northern district.	Shipment of adulterated jelly from California to Arizona.	Trial by jury; verdict of guilty; fined $200. (Notice of Judgment No. 1622.)
2358	Bettman Johnson Co.	Ohio, southern district.	Shipment of misbranded wine from Ohio to Iowa.	Trial by jury; verdict of guilty; fined $50 and costs. (Notice of Judgment No. 1483.)
2363	Harry Nicholaou	Missouri, eastern district.	Shipment of adulterated and misbranded olive oil from Missouri to Oklahoma.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1540.)
2364	R. C. Chance's Sons	New Jersey	Shipment of adulterated tomato catsup from New Jersey to New York.	Plea of non vult by defendant; fined $100. (Notice of Judgment No. 1522; consolidated with F. & D Nos. 2616, 2462, and 2642.)
2365	Bettman Johnson Co.	Ohio, southern district.	Shipment of misbranded maraschino cherries from Ohio to Missouri.	Trial by jury; verdict of guilty; fined $50 and costs. (Notice of Judgment No. 1664.)
2367	McIlhenny Co.	Louisiana, eastern district.	Shipment of misbranded lemon and vanilla extract from Louisiana to Arizona.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1772.)
2369	Meyer & Lange	New York, southern district.	Shipment of adulterated anchovy paste from New York to Massachusetts.	Plea of guilty by defendant; court suspended sentence. (Notice of Judgment No. 1408.)
2370	St. Louis Sirup & Preserving Co.	Missouri, eastern district.	Shipment of misbranded apple butter from Missouri to West Virginia.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1400.)
2387	Herman Luhring	Indiana	Shipment of adulterated milk from Indiana to Ohio	Trial by jury; verdict of guilty.
2388	John Lotshaw	do	do	Trial by jury; verdict of guilty; fined $25 and costs. (Notice of Judgment No. 1508.)
2399	Edenton Peanut Co.	North Carolina, eastern district.	Shipment of adulterated peanuts from North Carolina to Pennsylvania.	Plea of nolo contendere by defendant; sentence suspended. (Notice of Judgment No. 1263.)
2418	Arturo Marchesini	Illinois, northern district.	Shipment of adulterated and misbranded salad oil from Illinois to Minnesota.	Trial by jury; verdict guilty; fine $100 and costs. (Notice of Judgment No. 1404.)
2421	J. B. Alexander	Kentucky, eastern district.	Shipment of adulterated milk from Kentucky to Ohio	Plea of guilty by defendant; fined $25. (Notice of judgment No. 1526.)
2422	Henry Menke	do	do	Do.
2424	S. M. Hudson	do	do	Do.
2427	G. E. Caroll	do	do	Do.
2428	J. F. West	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1526.)
2437	J. W. Horter	New York, southern district.	Shipment of misbranded drug product from New York to Tennessee.	Plea of guilty by defendant; fined $200. (Notice of Judgment No. 1544.)
2439	do	do	do	Plea of guilty by defendant; fined $200. (Notice of Judgment No. 1545.)
2441	Buckhorn Lithia Water Co.	North Carolina, eastern district.	Shipment of misbranded water from North Carolina to Georgia.	Plea of guilty by defendant; sentence suspended on payment of costs.
2443	C. I. Hood Co.	Massachusetts	Shipment of misbranded drug product from Massachusetts to the District of Columbia.	Nolle prossed.
2445	Phillips Packing Co.	Maryland	Shipment of adulterated tomato pulp from Maryland to West Virginia.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1261.)
2452	Wheeler & Perry	Arizona	Sale in Arizona Territory of adulterated apples	Ignored by grand jury.
2453	Mihalovitch Co	Ohio, southern district.	Shipment of adulterated and misbranded peppermint extract from Ohio to Pennsylvania.	Trial by jury; verdict guilty; fined $100 and costs. (Notice of Judgment No. 1402.)
2454	C. L. Cotton Perfume & Extract Co.	New York, Northern district.	Shipment of misbranded drug from New York to Pennsylvania.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1784.)
2455	Pure Food Distilling Co.	Missouri, eastern district.	Shipment of adulterated and misbranded blackberry brandy from Missouri to Illinois.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1435.)
2456	Sonoret Chemical Co.	do	Shipment of misbranded drugs from Missouri to Oregon.	Plea of guilty by defendant; fined $10. Notice of Judgment No. 1232.)
2460	M. R. Stern	New York, southern district.	Shipment of adulterated and misbranded wine from New York to Massachusetts.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1701; consolidated with F. & D., No. 2715.)

Cases reported for criminal prosecution under the food and drugs act, June 30, 1906, prior to the fiscal year 1912, and terminated during the fiscal year 1912—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
2462	R. C. Chance's Sons...	New Jersey..........	Shipment of adulterated tomato catsup from Pennsylvania to Massachusetts.	Plea of non vult by defendant; fined $100. (Notice of Judgment No. 1522; consolidated with F. & D., Nos. 2364, 2616, and 2642.)
2466	Ben Evers............	Kentucky, eastern district.	Shipment of adulterated milk from Kentucky to Ohio.....	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1526.)
2468	Bettman Johnson Co..	Ohio, southern district.	Shipment of misbranded "Gin Curcubita" from Ohio to Kentucky.	Plea of nolo contendere by defendant; fined $50 and costs (Notice of Judgment No. 1672.)
2476	Atlas Preserving Co...	Maryland............	Shipment of adulterated catsup from Maryland to the District of Columbia.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1269.)
2478	A. Saunig & Co.......	New York, southern district.	Shipment of misbranded drug from New York to Pennsylvania.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1222.)
2482	Rheinstrom Bros......	Ohio, southern district.	Shipment of adulterated ginger extract from Ohio to Pennsylvania.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1433.)
2483	Bettman Johnson Co..	.....do...............	Shipment of misbranded maraschino cherries from Ohio to Louisiana.	Trial by jury; verdict guilty; fined $50 and costs. (Notice of Judgment No. 1664.)
2484	Pacific Honey Co......	Oregon...............	Shipment of adulterated and misbranded cider vinegar from Oregon to Washington.	Plea of nolo contendere by defendant; fined $25 and costs. (Notice of Judgment No. 1410.)
2487	Union Manufacturing & Packing Co.	Utah..................	Shipment of misbranded essence of Jamaica ginger from Utah to Wyoming.	Information filed; dismissed.
2489	McMechen Preserving Co.	West Virginia, northern district.	Shipment of misbranded jam from West Virginia to Indiana.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1276.)
2504	Northwest Mills Co....	Minnesota............	Shipment of misbranded stock feed from Minnesota to Indiana.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1840; consolidated with F. & D., No. 2138.)
2515	Kornfalfa Feed Milling Co.	Missouri, western district.	Shipment of misbranded feed from Missouri to Pennsylvania.	Trial by jury; verdict guilty; fined $75 and costs. (Notice of Judgment No. 1678.)
2516	McMechen Preserving Co.	West Virginia, northern district.	Shipment of misbranded preserves from West Virginia to Indiana.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1276.)
2518	Charles E. Meyers & Co.	Illinois, northern district.	Shipment of adulterated and misbranded cider vinegar from Illinois to Iowa.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1695.)
2531	Acme Extract & Chemical Works.	Pennsylvania, middle district.	Shipment of adulterated vanilla extract from Pennsylvania to the District of Columbia.	Plea of guilty by defendant; fined $10.
2536	McMechen Preserving Co.	West Virginia, northern district.	Shipment of adulterated catsup from West Virginia to the District of Columbia.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1276.)
2542	Edw. Westen Tea & Spice Co.	Missouri, eastern district.	Shipment of misbranded rice from Missouri to Colorado...	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1361.)
2546	J. Graffini & Co.......	New York, southern district.	Shipment of adulterated and misbranded vermuth from New York to Pennsylvania.	Trial by jury; verdict guilty as to charge of adulteration; defendant fined $200; information charging misbranding nolle prossed. (Notice of Judgment No. 1792.)
2551	H. M. Gidden.........	.....do...............	Shipment of adulterated tomato sauce from New York to Pennsylvania.	Trial by jury; verdict guilty; fined $100. (Notice of Judgment No. 1693.)
2553	McMechen Preserving Co.	West Virginia, northern district.	Shipment of adulterated tomato catsup from West Virginia to Tennessee.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1276.)

2554	Southern Fibre Co.	Virginia, eastern district.	Shipment of misbranded stock feed from Virginia to North Carolina.	Plea of nolo contendere by defendant; fined $20.
2555	Charles G. Summers & Co.	Maryland	Shipment of adulterated tomato pulp from Maryland to Kentucky.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1268.)
2556	V. Del Gaizo	New York, southern district.	Shipment of adulterated tomato paste from New York to Pennsylvania.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1477.)
2557	do	do	do	Do.
2560	McMechen Preserving Co.	West Virginia, northern district.	Shipment of adulterated catsup from West Virginia to the District of Columbia.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1276.)
2563	Torsch Packing Co.	Maryland	Shipment of adulterated tomato pulp from Maryland to Illinois.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1270.)
2568	Pressing & Orr Co.	Ohio, northern district	Shipment of adulterated catsup from Ohio to West Virginia	Plea of nolo contendere by defendant; fined $25. (Notice of Judgment No. 1213.)
2573	Northeast Preserving Works.	Pennsylvania, western district.	Shipment of adultreated tomato pulp from Pennsylvania to Ohio.	Plea of nolo contendere by defendant; fined $100 and costs. (Notice of Judgment No. 1625.)
2574	Otto Kuehne Preserving Co.	Kansas	Shipment of adulterated and misbranded catsup from Kansas to Oklahoma.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1863.)
2575	Kellogg Manufacturing Co.	Iowa	Shipment of misbranded sugar butter from Iowa to Indiana.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1548.)
2579	Columbia Conserve Co.	Indiana	Shipment of adulterated catsup from Indiana to Colorado.	Nolle-prossed.
2581	Phoenix Packing Co.	California, southern district.	Shipment of misbranded raisins from California to Arizona.	Plea of guilty by defendant; fined $1. (Notice of Judgment No. 1938.)
2582	Oelerich & Berry Co.	Illinois, northern district.	Shipment of misbranded jelly from Illinois to Nebraska.	Trial by jury; disagreed. No further prosecution. (Notice of Judgment No. 1897.)
2592	Charles F. Ogren & Co.	do	Shipment of misbranded "Hop Cream" from Illinois to Indiana.	Plea of guilty by defendant; fined $200 and costs. (Notice of Judgment No. 1497.)
2594	W. P. [illegible]	New York, southern district.	Shipment of misbranded olive oil from New York to Missouri.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1520.)
2597	American Chicle Co.	Oregon	Shipment of misbranded chewing gum from Oregon to Washington.	Trial by jury; verdict guilty; fined $100 and costs. (Notice of Judgment No. 1939.)
2598	Kuner Pickle Co.	Utah	Shipment of adulterated catsup from Utah to Idaho	Plea of guilty by defendant; fined $150 and costs. (Notice of Judgment No. 1670.)
2616	R. C. Chance's Sons	New Jersey	Shipment of adulterated catsup from New Jersey to the District of Columbia.	Plea of non vult by defendant; fined $100. (Notice of Judgment No. 1522; consolidated with F. & D. Nos. 2364, 2462, and 2642.)
2636	St. Louis Syrup & Preserving Co.	Missouri, eastern district.	Shipment of misbranded Open Kettle Molasses Temtors from Missouri to Wisconsin.	Plea of guilty by defendant; fined $10 and costs. (Notice of Judgment No. 1399.)
2642	R. C. Chance's Sons	New Jersey	Shipment of adulterated catsup from New Jersey to Massachusetts.	Plea of non vult by defendants; fined $100. (Notice of Judgment No. 1522; consolidated with F. & D. Nos. 2364, 2462, and 2616.)
2646	Marrone & Lafaro	New York, northern district.	Shipment of adulterated and misbranded olive oil from New York to Missouri.	Plea of guilty by defendants; fined $50 each.
2650	Langley & Michaels Co.	California, northern district.	Shipment of adulterated and misbranded peroxide of hydrogen from California to Washington.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1390.)
2653	Howard Drug & Medicine Co.	Maryland	Shipment of misbranded "Make Man Tablets" from Maryland to the District of Columbia.	Plea of nolo contendere by Henry Klingel, guarantor; fined $5. (Notice of Judgment No. 1706.)
2655	Meyer Bros. Drug Co	Missouri, eastern district.	Shipment of adulterated and misbranded peroxide of hydrogen from Missouri to Nebraska.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1529.)
2671	Earll Coffee Co.	Missouri, western district.	Shipment of misbranded apple butter from Missouri to Kansas.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1356.)
2684	Charles C. Dade	District of Columbia	Sale in the District of Columbia of adulterated milk	Defendant convicted in police court; case on appeal in the Court of Appeals of the District of Columbia.

Cases reported for criminal prosecution under the food and drugs act, June 30, 1906, prior to the fiscal year 1912, and terminated during the fiscal year 1912—Continued.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of case.
2685	Edgar Morgan Co	Tennessee, western district.	Shipment of adulterated and misbranded cattle feed from Tennessee to Florida.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1803.)
2686	Gordon Syrup Co	Califronia, northern district.	Shipment of misbranded sirup from California to Arizona	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1394.)
2687	Country Club Egg Co.	Illinois, northern district.	Shipment of adulterated desiccated egg product from Illinois to New York.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1760.)
2691	Henry Heide	New York, southern district.	Shipment of adulterated almond paste from New York to California.	Trial by jury; acquittal. (Notice of Judgment No. 1335.)
2693	Ignatius Gross Co	do	Shipment of adulterated tomato sauce from New York to Pennsylvania.	Plea of guilty by defendants; fined $25. (Notice of Judgment No. 1242.)
2694	Liebenthal Bros. & Co.	Ohio, northern district	Shipment of misbranded cherries from Ohio to Missouri	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1504.)
2697	Bessire & Co	Indiana	Shipment of misbranded blackberry pie filling compound from Indiana to Kentucky.	Plea of guilty by defendant to first count of information; fined $200 and costs; remaining counts of information nolle-prossed. (Notice of Judgment No. 1593; consolidated with F. & D. 2768)
2701	English Canning Co	Indiana	Shipment of adulterated tomato pulp from Indiana to Kentucky.	Plea of guilty by defendant; fined $100. (Notice of Judgment No. 1509.)
2702	S. D. Conwell & Co	Pennsylvania, eastern district.	Shipment of adulterated and misbranded vanilla flavor from Pennsylvania to New Jersey.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1216.)
2704	Western Fruit Products Co.	Illinois, eastern district.	Shipment of adulterated and misbranded vinegar from Illinois to Oklahoma.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1743.)
2706	Liquid Carbonic Co	Missouri, western district.	Shipment of adulterated and misbranded maraschino cherries from Missouri to Kansas.	Plea of nolo contendere by defendant; fined $50 and costs. (Notice of Judgment No. 1679.)
2707	J. R. Watkins Medical Co.	Minnesota	Shipment of misbranded Vanillin Powder from Minnesota to Tennessee.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1940.)
2711	R. C. Chance's Sons	New Jersey	Shipment of adulterated tomato catsup from New Jersey to Massachusetts.	Plea of non vult by defendant; fined $100. (Notice of Judgment No. 1563.)
2712	Buckeye Cotton Oil Co.	Ohio, southern district	Shipment of misbranded cottonseed meal from Ohio to Maine.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1223.)
2713	Clearo Manufacturing Co.	Illinois, northern district.	Shipment of misbranded Clearo from Illinois to Indiana	Plea of guilty by defendant; fined $200 and costs. (Notice of Judgment No. 1500.)
2715	M. R. Stern	New York, southern district.	Shipment of adulterated and misbranded sirup of Tamarind from New York to Missouri.	Plea of guilty by defendant; fined $50. (Notice of Judgment No. 1701; consolidated with F. & D. No. 2460.)
2718	St. Louis Syrup & Preserving Co.	Missouri, eastern district.	Shipment of misbranded table sirup from Missouri to Wisconsin.	Plea of guilty by defendant to first count of information; fined $50 and costs; second count dismissed. (Notice of Judgment No. 1367.)
2719	Danna Canned Goods Co.	Ohio, southern district	Shipment of adulterated tomato paste from Ohio to Kentucky.	Plea of guilty by defendant; fined $25 and costs. (Notice of Judgment No. 1407.)
2726	Alart & McGuire	New York, southern district.	Shipment of misbranded mustard from New York to Pennsylvania.	Trial by jury; verdict of not guilty by direction of court. (Notice of Judgment No. 1553.)
2727	do	do	Shipment of adulterated and misbranded mustard from New York to Georgia.	Do.

2731	E. S. Wells	New Jersey	Shipment of misbranded Hair Balsam from New Jersey to Ohio.	Plea of non vult by defendant; sentence suspended. (Notice of Judgment No. 1228.)
2737	William Haigh Co.	Maryland	Shipment of adulterated and misbranded vanilla extract from Maryland to Pennsylvania.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1366.)
2738	Star Wafer Co.	Alabama, northern district.	Shipment of adulterated ice-cream cones from Alabama to Tennessee.	Trial by jury; verdict guilty; fined $100 and costs. (Notice of Judgment No. 1655.)
2741	Kellogg-Birge Co.	Iowa, southern district	Shipment of misbranded sugar butter from Iowa to Missouri.	Plea of guilty by defendant; fined $20 and costs. (Notice of Judgment No. 1549.)
2742	Philadelphia Pickling Co.	New Jersey	Shipment of adulterated tomato paste from New Jersey to Pennsylvania.	Trial by jury, verdict guilty; fined $100. (Notice of Judgment No. 1744.)
2745	C. W. Martin Co.	Maryland	Shipment of adulterated oysters from Maryland to the District of Columbia.	Plea of nolo contendere by defendant; fined $5. (Notice of Judgment No. 1337.)
2746	Buckeye Cotton Oil Co.	Alabama, southern district.	Shipment of misbranded cottonseed meal from Alabama to Vermont.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1862.)
2748	James T. Ayers	Virginia, western district.	Shipment of adulterated dried peaches from Virginia to Maryland.	Trial by jury; disagreement. (Notice of Judgment No. 1808.)
2749	Liebenthal Bros. & Co.	Ohio, northern district	Shipment of misbranded Damiana from Ohio to Pennsylvania.	Plea of guilty by defendant; fined $100 and costs. (Notice of Judgment No. 1505; consolidated with F. & D. No. 2694.)
2750	Ignatius Gross	New York, southern district.	Shipment of adulterated tomato conserve from New York to Pennsylvania.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1646.)
2765	James E. Schaeffer	Maryland	Shipment of misbranded candy from Maryland to Pennsylvania.	Trial by jury; verdict of not guilty. (Notice of Judgment No. 1351.)
2767	National Pickle & Canning Co.	Missouri, western district.	Shipment of misbranded tomato catsup from Missouri to Kansas.	Plea of guilty by defendant; fined $50 and costs. (Notice of Judgment No. 1758.)
2768	Bessire & Co.	Indiana	Shipment of misbranded jelly from Indiana to Kentucky.	Trial by the court; finding of guilty upon first count of the indictment; fined $200 and costs; remaining counts nolle-prossed. (Notice of Judgment No. 1593; consolidated with F. & D. 2697.)

SUMMARY.

Terminated in favor of the Government	186
Terminated in favor of the defendants	14
Nolle-prossed	21
Grand jury returned no indictment	5
Information filed; defendant not found	2
Information filed; dismissed	6
Information quashed	3
Mistrial	2
Total	239

Cases under section 10 of the food and drugs act of June 30, 1906, reported prior to the fiscal year 1912 and finally determined during the fiscal year 1912.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of the case.
878	400 sacks of flour	District of Columbia	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond; appeal pending in the Court of Appeals of the District of Columbia. (Notice of Judgment No. 1768.)
930	110 sacks of cottonseed meal.	Florida, southern district.	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1773.)
1206	2 barrels of vanilla extract.	Louisiana, eastern district.	do	Judgment of the district court condemning and forfeiting the products to the United States affirmed by the United States Court of Appeals, fifth circuit. (Notice of Judgment No. 1451.)
1219	14 barrels of catsup	do	do	Judgment of the district court condemning and forfeiting the product to the United States affirmed by the United States Court of Appeals, fifth circuit. (Notice of Judgment No. 1529.)
1245	1 car of oats	Arkansas, western district.	do	Decree of condemnation and forfeiture; goods released under bond.
1266	3 barrels of vanilla and Tonka Compound.	Texas, western district.	do	Dismissed by order of court; appeal by libelant; pending before the United States Circuit Court of Appeals. (Notice of Judgment No. 1306.)
1360	40 sacks of corn meal	North Carolina, eastern district.	Adulterated	Decree of condemnation and forfeiture; goods sold. (Notice of Judgment No. 1328.)
1363	70 sacks of corn meal	do	do	Decree of condemnation and forfeiture.
1367	1 barrel of vanilla extract.	Texas, southern district.	Adulterated and misbranded	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1623.)
1639	25,008 pounds of frozen eggs.	New York, eastern district.	Adulterated	Decree of condemnation, forfeiture, and destruction; costs of $1,179.48 assessed against claimants. (Notice of Judgment No. 1668.)
1751	6 drums of desiccated eggs.	New York, southern district.	do	Goods released under bond.
1799	30 crates of ice-cream cones.	Alabama, northern district.	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1558.)
2047	20 barrels of vinegar	Missouri, eastern district.	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1844.)
2086	100 barrels of vinegar	do	do	Dismissed under stipulation that goods be relabeled.
2103	443 cans of frozen eggs.	New Jersey	Adulterated	Decree of the district court reversed with directions to enter a decree of condemnation in favor of the Government. (Notice of Judgment No. 1576.)
2139	100 cans of frozen eggs and 11 drums of dried eggs.	Massachusetts	do	Dismissed as to 50 cans of eggs.
2149	25 crates of frozen eggs.	Illinois, northern district.	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1444.)
2172	16 cases of tomato paste	California, northern district.	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1231.)
2182	68 cases of tomato paste	do	Adulterated and misbranded	Do.
2313	1 barrel of vanilla extract.	New Jersey	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1440.)
2505	7 cases of tomato paste.	Pennsylvania, western district.	Adulterated	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1469.)
2506	131 boxes of candy eggs	Massachusetts	do	Trial by jury; verdict favorable to claimants; appeal by the United States to the circuit court of appeals; pending. (Notice of Judgment No. 1642.)

2508	1 barrel of vanilla	New Jersey	Adulterated and misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1448.)
2510	2 barrels of whisky	Georgia, southern district.	Misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1937.)
2522	80 boxes of candy eggs and 96 boxes of candy peaches and pears.	Massachusetts	Adulterated	Trial by jury; verdict favorable to claimants; appeal by the United States to the circuit court of appeals; pending. (Notice of Judgment No. 1642.)
2538	1 ten-gallon package of vanilla.	New Jersey	Adulterated and misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1447.)
2591	5 packages of Mother's Gelatine.	District of Columbia	Adulterated	Libel filed; dismissed.
2601	3 barrels of vanilla and Tonka Flavor.	Louisiana, eastern district.	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1797.)
2602	3 barrels of vinegar	New York, western district.	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1657.)
2603	17 barrels of vinegar	do	do	Do.
2622	3 dozen packages "Denton's Healing Balsam."	Michigan, eastern district.	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1464.)
2624	6 dozen packages "Denton's Healing Balsam."	do	do	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1465.)
2633	90 barrels of vinegar	Massachusetts	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1885.)
2644	10 boxes of cheese	Kentucky, eastern district.	Misbranded	Do.
2658	1 barrel of vanilla	New York, northern district.	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1639.)
2667	10 kegs of cider	Kentucky, eastern district.	Misbranded	Decree of condemnation and forfeiture; goods ordered sold. (Notice of Judgment No. 1567.)
2708	50 barrels of vinegar	Minnesota	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1562.)
2728	16 cases of wine	Missouri, eastern district.	Misbranded	Decree of condemnation, forfeiture, and destruction. (Notice of Judgment No. 1144.)
2730	70 sacks of corn meal	South Carolina	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1342.)
2730a	58 sacks of corn meal	do	do	Do.
2736	50 cases of salmon	Texas, western district.	do	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1578.)
2751	4 barrels of turpentine.	Connecticut	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1373.)

SUMMARY.

Decrees of condemnation and forfeiture; goods destroyed	12
Decrees of condemnation and forfeiture; goods released on bond	18
Decrees of condemnation and forfeiture; goods ordered to be sold	3
Decrees of condemnation and forfeiture; disposition of goods not reported	1
Judgments for claimants	3
Decisions of appellate courts for Government	3
Appeals pending	3
Libels filed; discontinued	1

Cases under section 2 of the food and drugs act of June 30, 1906, reported to United States attorneys by collaborators of the department and finally determined during the fiscal year 1912.

F. & D. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or present status of the case.
103c	William H. Orme, jr	District of Columbia	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1134.)
104c	William M. Thompson	do	Sale in the District of Columbia of adulterated cream	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1160.)
105c	Howard L. Smith	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1161.)
107c	George L. Hildebrand	do	do	Plea of guilty by defendant; fined $20. (Notice of Judgment No. 1209.)
108c	John W. Humm	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1210.)
109c	Russell C. Thomas	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1236.)
110c	George M. Kephart	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1307.)
111c	Harry L. Thomas	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1311.)
112c	Clinton E. Smith	do	do	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1312.)
113c	John W. Grove	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1310.)
113c	Joseph F. Lewis	do	do	Plea of guilty by defendant; fined $10 (Notice of Judgment No. 1423.)
114c	Eli N. Hershey	do	do	Trial by court; finding of guilty; fined $25. (Notice of Judgment No. 1424.)
115c	John P. Ray, jr	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1425.)
116c	Edward T. Schaeffer	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $20. (Notice of Judgment No. 1498.)
117c	Harvey L. Zimmerman	do	do	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1499.)
118c	Richard D. Hawkins	do	do	Plea of guilty by defendant; fined $30. (Notice of Judgment No. 1515.)
119c	Walter D. Stockman	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1517.)
120c	Joseph W. Cordell	do	do	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1516.)
121c	do	do	do	Do.
122c	Elias D. King	do	do	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1581.)
123c	Charles K. Summers	do	do	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1582.)

124c	Robert N. Heth	do	do	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1583.)
125c	Curtis W. Thomas	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1658.)
126c	George P. Altman	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1659.)
127c	John W. Engle	do	do	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1660.)
128c	John Paul Woods	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $25. (Notice of Judgment No. 1661.)
129c	Albert Mack	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1662.)
130c	John W. Smith	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $5. (Notice of Judgment No. 1663.)
132c	James S. Kelly & Sons	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1748.)
133c	Mrs. John S. Lakin	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1749.)
134c	Roy M. Gordon	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1759.)
135c	Clayborne A. Thomas	do	Sale in the District of Columbia of adulterated milk.	Plea of guilty by defendant; fined $20. (Notice of Judgment No. 1750.)
136c	Wm. D. Zimmerman	do	Sale in the District of Columbia of adulterated cream.	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1751.)
137c	Frank Irvine	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1752.)
138c	John M. Kline	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1753.)
140c	John W. Smith	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1855.)
141c	Lewis B. Hargett	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1854.)
142c	Samuel P. Knill	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1856.)
143c	James L. Maddox	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1857.)
144c	John Ball and Garrett Ball	do	do	Plea of guilty by defendants; fined $10. (Notice of Judgment No. 1858.)
145c	William T. Hall	do	do	Plea of guilty by defendant; fined $15. (Notice of Judgment No. 1859.)
146c	Laban B. Armstrong	do	do	Plea of guilty by defendant; fined $10. (Notice of Judgment No. 1860.)

Cases under section 10 of the food and drugs act of June 30, 1906, reported to United States attorneys by collaborators of the department during the fiscal year 1912.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition or present status of case.
106c	2 carloads of oats	Virginia, eastern district	Adulterated and misbranded	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1165.)
131c	100 bags of alfalfa meal and 400 sacks of Sucrene dairy food.	do	do	Libel filed; dismissed.
139c	30,000 pounds of corn and oats and 10,000 pounds of cracked corn.	do	do	Libel filed; pending.

Cases under section section 10 of the food and drugs act of June 30, 1906, reported to United States attorneys by collaborators of the department prior to the fiscal year 1912 and terminated during the fiscal year 1912.

F. & D. case No.	Article.	Judicial district.	Charge.	Disposition.
98c	29 cans of molasses	North Dakota	Adulteration and misbranding	Decree of condemnation and forfeiture; goods released under bond. (Notice of Judgment No. 1461.)

Summary of suits under the twenty-eight hour law resulting in judgment for the Government during the fiscal year from July 1, 1911, to June 30, 1912.

Case No.	Railroad involved.	Judicial district.	Penalty assessed.	Costs assessed.
1770	Atchison, Topeka & Santa Fe	Kansas	$100.00	$129.60
1779	do	do	100.00	38.45
1794	do	do	100.00	22.20
1795	do	do	100.00	38.70
2265	do	Oklahoma, western district	100.00	56.25 [1]2.75
2374	do	New Mexico	100.00	112.10
2375	do	do	100.00	57.80
2376	do	do	100.00	61.40
2468	do	do	100.00	23.30
2829	do	Kansas	100.00	15.65
2963	do	do	100.00	15.65
2850	Baltimore & Ohio Southwestern	Illinois, eastern district	100.00	13.55
2891	do	Ohio, southern district	100.00	20.62
2907	do	do	200.00	20.12
2128	Boston & Maine	Massachusetts	200.00	
1785	Chicago, Burlington & Quincy	Nebraska	100.00	71.51
2499 2505 2527	Chicago, Milwaukee & St. Paul	Minnesota	500.00	19.57
2749	do	Iowa, southern district	100.00	20.89
2886	do	Iowa, northern district	100.00	12.06
3066	do	Minnesota	100.00	13.30
2651 2654	Chicago, Rock Island & Pacific	Tennessee, western district	100.00	31.89
2877	do	Kansas	100.00	16.65
2892	do	do	100.00	16.65
2895	do	do	100.00	16.75
2917	do	do	100.00	16.65
2918	do	do	100.00	16.65
2923	do	do	100.00	16.75
2936	do	do	100.00	16.65
3147	Chicago Great Western	Minnesota	100.00	17.07
2759 2760	Chicago & North Western	Illinois, northern district	100.00	15.30
2947	Cincinnati, Hamilton & Dayton	Ohio, southern district	100.00	18.91
3035	Cincinnati, New Orleans & Texas Pacific	do	100.00	18.91
2902	Covington & Cincinnati Elevated R. R. & Transfer & Bridge Co.	do	100.00	18.67
2994	do	do	100.00	18.97
2301	Denver & Rio Grande	Colorado	100.00	21.62
2481	do	do	100.00	32.07
2492	do	do	100.00	
2493 2494	do	do	100.00	
6 7	Erie	New York, western district	200.00	16.31
1604	Grand Trunk	do	500.00	32.91
2496 2497 2498	Great Northern	Minnesota	200.00	18.27
2993	do	Montana	100.00	9.00
2828	Gulf, Colorado & Santa Fe	Texas, northern district	100.00	22.00
2905	Illinois Central	Iowa, northern district	100.00	12.06
3039	do	Illinois, eastern district	100.00	13.61
3100	do	do	100.00	13.55
3107	do	Kentucky, western district	100.00	16.70
1992	Kansas City, Mexico & Orient	Oklahoma, western district	100.00	4.75
2915	Kansas City Southern	Kansas	100.00	20.56
2945	do	do	100.00	20.56
3034	do	do	100.00	18.40
290	Lake Shore & Michigan Southern	New York, western district	200.00	
291 292	do	do	200.00	16.31
293	do	do	200.00	
294 294½	do	do	200.00	16.31
446 448 449	do	do	200.00	16.31
447	do	do	200.00	16.31
450 451	do	do	200.00	16.31
2748	do	Ohio, northern district	100.00	18.96
2751	do	do	100.00	19.15
2897	Louisville & Nashville	Illinois, eastern district	100.00	19.61
1788	Michigan Central	New York, western district	500.00	
1916	Missouri, Kansas & Texas	Oklahoma, eastern district	100.00	13.65
2910	do	do	100.00	14.55

[1] Interest.

Summary of suits under the twenty-eight hour law resulting in judgment for the Government during the fiscal year from July 1, 1911, to June 30, 1912—Continued.

Case No.	Railroad involved.	Judicial district.	Penalty assessed.	Costs assessed.
2011 2012	Missouri Pacific	Kansas	$100.00	$19.80
2013	do	do	100.00	19.80
2463 2464	do	do	100.00	19.00
2485	do	do	100.00	18.85
2171	New York Central & Hudson River	New York, western district	250.00	....
2172	do	do	500.00	....
2173	do	do	500.00	....
[1]2176	do	do	1,000.00	....
2147	do	New Jersey	200.00	....
2135	do	do	200.00	....
[1]2170	do	New York western district	750.00	17.01
2174 2175	do	do	500.00	23.26
2570	do	Massachusetts	100.00	....
2803	do	do	100.00	....
3240	do	do	100.00	16.54
1594	do	New York, western district	500.00	....
540 541	New York, Chicago & St. Louis	do	200.00	44.62
2571	New York, New Haven & Hartford	Connecticut	100.00	19.31
2617	do	do	100.00	17.01
2801	do	do	100.00	17.92
2802	do	do	100.00	20.37
2811	do	do	100.00	
2823	do	do	100.00	
2883	do	do	500.00	22.22
2620	Northern Pacific	Montana	100.00	13.30
2952	do	Minnesota	100.00	17.07
2813	Oregon Short Line	Idaho	200.00	174.00
2616	do	do	100.00	57.75
3130	Oregon-Washington R. R. & Navigation Co	do	200.00	101.51
3244	do	do	200.00	54.70
3248	do	do	100.00	76.40
1861	Pecos & Northern Texas	Texas, northern district	100.00	125.90
2555	do	do	500.00	135.40
2966	do	do	100.00	15.40
3180	do	do	100.00	44.40
2180 2181 2182 2183	Pittsburgh, Cincinnati, Chicago & St. Louis.	Pennsylvania, western district	100.00	16.30 [2]3.53
2275	do	do	100.00	
2188	do	do	100.00	
2224 2225	do	do	100.00	
2223 2226	do	do	100.00	
2271	do	do	100.00	
2092	do	do	100.00	
2093 2094	do	do	100.00	
2091	do	do	100.00	
2144	do	do	100.00	
2145	do	do	100.00	
2146	do	do	100.00	
2184	do	do	100.00	
2082 2083 2084	do	do	100.00	16.20 [2]2.02
2087 2088 2089 2090	do	do	100.00	
2154	do	do	100.00	
2161 2162	do	do	100.00	
2163 2164 2165 2166	do	do	100.00	
2179	do	do	100.00	
2185 2186 2187	do	do	100.00	

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[1] Two violations under this number.

[2] Interest.

Summary of suits under the twenty-eight hour law resulting in judgment for the Government during the fiscal year from July 1, 1911, to June 30, 1912—Continued.

Case No.	Railroad involved.	Judicial district.	Penalty assessed.	Costs assessed.
2189 2190	Pittsburgh, Cincinnati, Chicago & St. Louis.	Pennsylvania, western district	$100.00	$16.30 [1] 2.03
2191	do	do	100.00	
2192 2193	do	do	100.00	
2194 2195 2196	do	do	100.00	
2214	do	do	100.00	
2215	do	do	100.00	
2216	do	do	100.00	
2231 2232 2233 2234 2235 2236 2237	do	do	100.00	16.20 [1] 1.74
2238 2239 2240 2241	do	do	100.00	
2242 2243 2244 2245	do	do	100.00	
2246 2247 2248 2249	do	do	100.00	
2261	do	do	100.00	
2263	do	do	100.00	
2095	do	do	100.00	16.30 [1] 2.03
2096 2097 2098 2099 2100 2101 2102	do	do	100.00	
2103 2104 2105 2106 2107	do	do	100.00	
2157 2158 2159 2160	do	do	100.00	
2270	do	do	100.00	
2272	do	do	100.00	
2273	do	do	100.00	
2284	do	do	100.00	16.10 [1] 1.99
2285	do	do	100.00	
2286	do	do	100.00	
2283	do	do	100.00	
2328	do	do	100.00	
2329 2330	do	do	100.00	
2331 2332	do	do	100.00	
2320	do	do	100.00	16.00 [1] 2.28
2506 2507	do	do	100.00	
2508 2509 2510 2511 2512 2513	do	do	100.00	
2514 2515 2516	do	do	100.00	
2517 2518 2519	do	do	100.00	

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[1] Interest.

Summary of suits under the twenty-eight hour law resulting in judgment for the Government during the fiscal year from July 1, 1911, to June 30, 1912—Continued.

Case No.	Railroad involved.	Judicial district.	Penalty assessed.	Costs assessed.
2520 2521 2522	Pittsburgh, Cincinnati, Chicago & St. Louis.	Pennsylvania, western district	$100.00	
2523 2524	do	do	100.00	
2525	do	do	100.00	
2642 2643	do	do	100.00	16.00 [1] 1.02
2644 2645 2646 2647 2648	do	do	100.00	
2649	do	do	100.00	
2075	Pennsylvania Co	do	100.00	16.20 [1] 3.28
2077 2078 2079 2080 2081	do	do	100.00	
2076	do	do	100.00	
2136	do	do	100.00	
2138	do	do	100.00	
2140	do	do	100.00	
2120 2121 2122	do	do	100.00	
2139	do	do	100.00	
2141	do	do	100.00	
2142	do	do	100.00	
2255 2256	do	do	100.00	
2143	do	do	100.00	
2287 2294 2295 2297	do	do	100.00	16.00 [1] 2.00
2288 2289 2290 2291 2292	do	do	100.00	
2293	do	do	100.00	
2296	do	do	100.00	
2298	do	do	100.00	
2299	do	do	100.00	
2300	do	do	100.00	
2417	do	do	100.00	16.00 [1] 3.03
2418	do	do	100.00	
2419	do	do	100.00	
2420	do	do	100.00	
2421 2422	do	do	100.00	
2423 2424	do	do	100.00	
2425	do	do	100.00	
2426 2427 2428 2429	do	do	100.00	
2430 2431 2432	do	do	100.00	
2433 2434	do	do	100.00	
2435 2436 2437 2438 2439	do	do	100.00	

[1] Interest.

Summary of suits under the twenty-eight hour law resulting in judgment for the Government during the fiscal year from July 1, 1911, to June 30, 1912—Continued.

Case No.	Railroad involved.	Judicial district.	Penalty assessed.	Costs assessed.
2317	Pennsylvania Co	Pennsylvania, western district	$100.00	$16.00 [1]2.28
2318	do	do	100.00	
2319	do	do	100.00	
2528 2529	do	do	100.00	
2530 2531 2532 2533 2534	do	do	100.00	
2535 2536	do	do	100.00	
2537	do	do	100.00	
2538 2539 2540 2541 2542 2543 2544 2545 2546 2547	do	do	100.00	
2586 2587 2588	do	do	100.00	16.00 [1]2.52
2589	do	do	100.00	
2590 2591 2592 2593	do	do	100.00	
2594 2595 2596 2597	do	do	100.00	
2598 2599 2600 2601 2602 2603	do	do	100.00	
2604	do	do	100.00	
2605	do	do	100.00	
2606 2607	do	do	100.00	
2608 2609 2610	do	do	100.00	
2744	St. Louis & San Francisco	Missouri, eastern district	100.00	18.94
2903	do	Kansas	100.00	16.65
2904	do	do	100.00	16.65
2916	do	do	100.00	16.65
3073	Southern	Illinois, eastern district	100.00	13.55
737	Southern Pacific	California, northern district	100.00	26.60
996	do	do	100.00	16.80
1791	do	do	100.00	13.90
2707	Wabash	Missouri, western district	100.00	19.30
2734	do	Illinois, eastern district	100.00	17.96

[1] Interest.

Number of cases	357
Penalties	$28,400.00
Costs	$2,937.13
Interest	$32.50

Violations of act of May 29, 1884, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
280	Verness E. Stealy	Michigan, western district	Interstate shipment of cattle affected with tuberculosis.	Plea of guilty entered and fine of $100 imposed.
317	C. F. Hunt	New York, northern district	do	Plea of not guilty entered; pending.
325	W. J. Cummings	Missouri, western district	Interstate movement of a cow affected with tuberculosis.	Suit filed; pending.
331	A. E. Leavitt	North Dakota	Interstate shipment of horses affected with glanders.	Defendant convicted and fine of $300 and imprisonment of 9 months imposed.
364	Jacob Paul	New Jersey	Interstate shipment of a cow affected with tuberculosis.	Plea of guilty entered and fine of $25 and costs ($16.10) and 30 days' imprisonment imposed.
380	William Keefer	Nebraska	Interstate shipment of cattle affected with tuberculosis.	Grand jury failed to indict.
396	C. E. Dawson & Byers Bros. Commission Co.	Missouri, western district	Interstate shipment of hogs affected with cholera.	Defendant indicted; pending.
399	J. Stauffer & Sons	Pennsylvania, eastern district	Interstate shipment of a cow affected with tuberculosis.	Verdict of not guilty.
434	Fritz Rothlisberger	Washington, western district	do	Plea of guilty entered and a fine of $100 imposed.
452	Max Glass	New York, southern district	Interstate movement of a horse affected with glanders.	Defendant convicted and a fine of $300 imposed.
485	Aaron Schick	Pennsylvania, eastern district	Interstate shipment of cows affected with tuberculosis.	Plea of guilty entered and fine of $100 and costs imposed.
499	John T. Hunt	Connecticut	do	Defendant arrested, waived examination, and held under $2,000 bond for next term of court.

Violations of act of March 3, 1905, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
536a	Terminal R. R. Association of St. Louis.	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
563a	do	Missouri, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
564a	do	do	do	Do.
568a	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
569a	do	do	do	Do.
570a	do	do	do	Do.

573a	do	do	do	Do.
575a	Terminal R. R. Association of St. Louis.	do	do	Do.
583a	do	do	do	Do.
584a	do	do	do	Do.
585a	do	do	do	Do.
586a	do	do	do	Do.
588a	do	do	do	Do.
590a	do	do	Interstate transportation of cattle from area quarantined for scabies.	Do.
591a	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
592a	do	do	do	Do.
593a	do	do	do	Do.
598a	Terminal R. R. Association of St. Louis.	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
603a	St. Louis Merchants Bridge Terminal Ry.	Illinois, eastern district	do	Do.
604a	do	Missouri, eastern district	do	Do.
605a	do	do	Interstate transportation of cattle from area quarantined for scabies.	Do.
608a	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
609a	do	do	do	Do.
610a	St. Louis Merchants Bridge Terminal Ry.	Missouri, eastern district	Interstate transportation of cattle from area quarantined for scabies.	Do.
611a	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
612a	do	do	do	Do.
613a	do	do	do	Do.
614a	do	do	do	Do.
615a	Terminal R. R. Association of St. Louis.	Missouri, eastern district	do	Do.
616a	do	do	do	Do.
617a	do	do	do	Do.
620a	do	do	do	Do.
625a	St. Louis National Stock Yards	Illinois, eastern district	do	Do.
627a	Terminal R. R. Association of St. Louis.	Missouri, eastern district	do	Do.
628a	do	do	do	Do.
629a	St. Louis National Stock Yards	Illinois, eastern district	do	Do.
630a	do	do	do	Do.
631a	St. Louis Merchants Bridge Terminal Ry.	Missouri, eastern district	Interstate transportation of cattle from area quarantined for scabies.	Do.
632a	Terminal R. R. Association of St. Louis.	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
633a	St. Louis National Stock Yards	Illinois, eastern district	do	Do.
634a	do	do	do	Do.
635a	St. Louis Merchants Bridge Terminal Ry.	Missouri, eastern district	do	Do.
636a	do	do	do	Do.
638a	do	do	Interstate transportation of cattle from area quarantined for scabies.	Do.

Violations of act of March 3, 1905, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912—Continued.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
639a	St. Louis Merchants Bridge Terminal Ry.	Missouri, eastern district	Interstate transportation of cattle from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
640a	Atchison, Topeka & Santa Fe Ry	Oklahoma, western district	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 imposed
641a	St. Louis Merchants Bridge Terminal Ry.	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
642a	Terminal R. R. Association of St. Louis.	do	do	Do.
46	John Zane and Elmer Edwards	Oklahoma, eastern district	Driving sheep interstate from area quarantined for scabies.	Nolle prosequi entered.
52	Terminal R. R. Association of St. Louis.	Missouri, eastern district	Interstate transportaton of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
75	do	Illinois, eastern district	Interstate transportation of cattle from area quarantined for scabies.	Do.
76	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
95	do	Missouri, eastern district	do	Do.
96	Terminal R. R. Association of St. Louis.	Illinois, eastern district	do	Do.
97	do	do	do	Do.
100	do	do	Interstate transportation of sheep from area quarantined for scabies.	Do.
101	do	do	Interstate transportation of cattle from area quarantined for scabies.	Do.
102	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
105	do	do	do	Do.
106	do	do	Interstate transportation of sheep from area quarantined for scabies.	Do.
107	do	do	Interstate transportation of cattle from area quarantined for scabies.	Do.
108	Terminal R. R. Association of St. Louis.	do	do	Do.
109	do	do	do	Do.
110	St. Louis Merchants Bridge Terminal Ry	do	do	Do.
115	Terminal R. R. Association of St. Louis.	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
116	do	do	Interstate transportation of sheep from area quarantined for scabies.	Do.
118	do	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
119	do	do	do	Do.
120	do	do	do	Do.
121	do	do	do	Do.

122	.....do	.....do	.....do	Do.
123	St. Louis National Stock Yards	.....do	Interstate transportation of sheep from area quarantined for scabies.	Do.
124	.....do	.....do	.....do	Do.
125	.....do	.....do	.....do	Do.
126	.....do	.....do	.....do	Do.
127	.....do	.....do	.....do	Do.
128	.....do	.....do	.....do	Do.
129	.....do	.....do	.....do	Do.
130	.....do	.....do	.....do	Do.
131	.....do	.....do	.....do	Do.
132	St. Louis Merchants Bridge Terminal Ry.	.....do	Interstate transportation of cattle from area quarantined for scabies.	Do.
133	Terminal R. R. Association of St. Louis.	.....do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
136	St. Louis National Stock Yards	.....do	Interstate transportation of sheep from area quarantined for scabies.	Do.
137	.....do	.....do	.....do	Do.
151	St. Louis Merchants Bridge Terminal Ry.	.....do	Interstate transportation of cattle from area quarantined for scabies.	Do.
152	.....do	.....do	.....do	Do.
153	.....do	.....do	.....do	Do.
154	.....do	.....do	.....do	Do.
155	.....do	.....do	.....do	Do.
156	.....do	.....do	.....do	Do.
165	St. Louis National Stock Yards	.....do	Interstate transportation of sheep from area quarantined for scabies.	Do.
166	.....do	.....do	.....do	Do.
168	.....do	.....do	.....do	Do.
176	.....do	.....do	.....do	Do.
177	.....do	.....do	.....do	Do.
179	St. Louis Merchants Bridge Terminal Ry.	.....do	Interstate transportation of cattle from area quarantined for scabies.	Do.
180	Terminal R. R. Association of St. Louis.	.....do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
181	.....do	.....do	.....do	Do.
187	St. Louis National Stock Yards	.....do	Interstate transportation of sheep from area quarantined for scabies.	Do.
192	Nashville, Chattanooga & St. Louis Ry.	Alabama, northern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Judgment entered by consent and fine of $100 imposed.
192a	Southern Ry	South Carolina	.....do	Judgment of guilty reversed by circuit court of appeals and nolle prosequi entered.
194	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme court in cases 281, 282, and 288.
195	.....do	.....do	.....do	Do.
197	Southern Ry	Georgia, northern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
205	Louisville & Nashville Ry	Alabama, southern district	.....do	Do.
206	.....do	.....do	.....do	Do.
211	St. Louis National Stock Yards	Illinois, eastern district	.....do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.

Violations of act of March 3, 1905, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912—Continued.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
212	Western & Atlantic R. R.	Georgia, northern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
213	D. L. Green	North Carolina, western district	Driving cattle interstate from area quarantined for splenetic fever.	Verdict of not guilty.
217	St. Louis & San Francisco R. R.	Oklahoma, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
221	St. Louis National Stock Yards	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
222	do	do	Interstate transportation of sheep from area quarantined for scabies.	Do.
223	Chicago, Rock Island & Pacific Ry.	Oklahoma, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Grand jury failed to indict because of absence of witnesses from United States.
225	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
226	do	do	do	Do.
227	do	do	do	Do.
233	Terminal R. R. Association of St. Louis.	Missouri, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
234	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Do.
235	do	do	do	Do.
236	do	do	do	Do.
237	do	do	do	Do.
238	do	do	do	Do.
239	do	do	do	Do.
240	do	do	do	Do.
241	do	do	do	Do.
242	do	do	do	Do.
243	do	do	do	Do.
244	St. Louis Merchants Bridge Terminal Ry.	Missouri, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
245	Kansas City Southern Ry.	Arkansas, western district	do	Plea of guilty entered and fine of $100 and costs imposed; motion for new trial.
246	do	do	do	Do.
247	St. Louis National Stock Yards	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
248	do	do	do	Do.
249	do	do	do	Do.
250	do	do	do	Do.
252	do	do	Interstate transportation of sheep from area quarantined for scabies.	Do.
253	do	do	do	Do.
254	do	do	do	Do.

260	R. E. Lambert	Alabama, southern district	Interstate shipment of a bull from area quarantined for splenetic fever.	Verdict of not guilty.
261	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
262	Atchison, Topeka & Santa Fe Ry.	Missouri, western district	Interstate transportation of cattle from area quarantined for splenetic fever.	Demurrer to indictment sustained.
270	St. Louis Merchants Bridge Terminal Ry.	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
271	do	do	do	Do.
272	do	do	do	Do.
277	Terminal R. R. Association of St. Louis.	do	do	Do.
278	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
281	Baltimore & Ohio Southwestern R. R.	Ohio, southern district	Interstate transportation of sheep from area quarantined for scabies.	Indictment quashed on grounds that no prosecution lies against a connecting carrier outside of the quarantined area; decision affirmed by Supreme Court.
282	do	do	do	Do.
283	St. Louis Merchants Bridge Terminal Ry.	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
288	Baltimore & Ohio Southwestern R. R.	Ohio, southern district	do	Indictment quashed on grounds that no prosecution lies against a connecting carrier outside of the quarantined area; decision affirmed by Supreme Court.
[illegible]	St. Louis National Stock Yards	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
290	do	do	do	Do.
291	do	do	do	Do.
[illegible]	do	do	do	Do.
[illegible]	do	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
298	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
299	Elizabeth Hill and Lee Snipes	North Carolina, western district	Interstate movement of a calf in a private conveyance from area quarantined for splenetic fever.	Nolle prosequi entered.
[illegible]	Joseph Spears	Arkansas, western district	Driving cattle interstate from area quarantined for splenetic fever.	Verdict of guilty; fine of $250 and costs ($69.50) imposed.
310	Illinois Central R. R.	Mississippi, southern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Defendant pleaded guilty in this case, Nos. 314 and 347, and fined $200 and costs.
311	Atchison, Topeka & Santa Fe Ry. and St. Joseph Belt Ry.	Missouri, western district	do	Plea of nolo contendere entered as to Atchison, Topeka & Santa Fe Ry. and fine of $100 and costs ($22.47) imposed; dismissed as to St. Joseph Belt Ry.
314	Illinois Central R. R.	Mississippi, southern district	do	Defendant pleaded guilty in this case, Nos. 311 and 347, and fined $200 and costs.
315	Louisville & Nashville R. R.	Georgia, northern district	do	Plea of guilty entered and fine of $100 and costs imposed.
318	P. J. Garrard and St. Louis Iron Mountain & Southern Ry.	Arkansas, eastern district	Transportation and delivery for shipment of cattle from area quarantined for splenetic fever.	Pleas of guilty entered as to each defendant and fine of $100 and costs imposed on each.

Violations of act of March 3, 1905, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912—Continued.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
320	St. Louis National Stock Yards	Illinois, eastern district	Transportation of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
321	do	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
322	J. A. Shanklin	South Carolina	Delivery for shipment of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 imposed.
326	B. R. Grimes	Oklahoma, western district	Driving cattle interstate from area quarantined for splenetic fever.	Dismissed because of lack of evidence.
327	do	do	do	Plea of guilty entered and fine of $100 and costs imposed.
328	St. Louis National Stock Yards	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
329	do	do	do	Do.
332	do	do	do	Do.
334	Hugo Milde	Oklahoma, western district	Driving cattle interstate from area quarantined for splenetic fever.	Plea of guilty entered and fine of $50 imposed.
335	William Blake	Missouri, eastern district	do	Plea of guilty entered and fine of $100 and costs imposed.
336	St. Louis and San Francisco R. R.	Oklahoma, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
338	Whitwell Beatson	North Carolina, western district	do	Plea of guilty entered and sentence suspended on payment of costs.
341	St. Louis National Stock Yards	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
342	St. Louis Merchants Bridge Terminal Ry.	do	do	Do.
343	do	do	do	Do.
344	John M. Merritt	Texas, southern district	Interstate shipment of mules from area quarantined for splenetic fever.	Verdict of not guilty.
347	Illinois Central R. R.	Mississippi, southern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Defendant pleaded guilty in this case, Nos. 311 and 314, and fined $200 and costs.
348	St. Louis Merchants Bridge Terminal Ry.	Illinois, eastern district	do	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
350	do	do	do	Do.
351	do	do	do	Do.
352	Richmond, Fredericksburg & Potomac R. R.	Virginia, eastern district	do	Demurrer to indictment sustained on grounds that no prosecution lies against a connecting carrier outside of the quarantined area.
353	Louisville & Nashville R. R.	Ohio, southern district	Interstate transportation of sheep from area quarantined for scabies.	Plea of guilty entered and fine of $100 and costs imposed.
354	do	do	do	Do.
357	Chicago, Rock Island & Pacific Ry.	Arkansas, eastern district	Interstate transportation of a cow from area quarantined for splenetic fever.	Defendant indicted; pending.

358	Atchison, Topeka & Santa Fe Ry	Texas, northern district	Interstate transportation of mules from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
360	J. E. Dunnaway	Alabama, southern district	Interstate shipment of calves from area quarantined for splenetic fever.	Demurrer to information sustained; will be presented to grand jury.
361	Mobile & Ohio R. R	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Plea of guilty entered and fine of $100 and costs imposed.
362	St. Louis Merchants Bridge Terminal Ry.	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Suit dismissed pursuant to decision of Supreme Court in cases 281, 282, and 288.
363	do	do	do	Do.
365	Hugh Chandler	Missouri, western district	Driving cattle interstate from area quarantined for splenetic fever.	Grand jury failed to indict.
367	Georgia R. R	Georgia, northern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Suit filed; pending.
368	J. L. Bourroum	Oklahoma, western district	Driving cattle interstate from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 imposed.
369	H. M. Stonebreaker and A. I. Adam	do	do	Plea of guilty entered by each defendant and fine of $100 imposed on each.
370	L. G. Chapel and Arch Baird	do	do	Grand jury failed to indict; criminal informations to be filed.
371	Jerome Wilson	do	do	Plea of guilty entered and fine of $100 imposed.
372	J. L. Gilchrist	Georgia, southern district	Interstate shipment of a calf from area quarantined for splenetic fever.	Grand jury failed to indict.
373 374 375 376 383	R. C. McManus	North Carolina, western district	Interstate shipment of cattle from area quarantined for splenetic fever.	Verdict of guilty as to each count and fine of $100 and costs imposed on one count.
378	John Fox	do	Driving a cow interstate from area quarantined for splenetic fever.	Plea of guilty entered and sentence suspended on payment of costs.
379	J. N. Nesbitt	South Carolina	Driving cattle interstate from area quarantined for splenetic fever.	Verdict of not guilty.
381	St. Louis and San Francisco R. R	Texas, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Defendant indicted; pending.
384	J. R. Timmerman	South Carolina	Interstate shipment of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 imposed.
385	Illinois Central R. R. and J. S. Woods	Mississippi, northern district	Transportation and delivery for shipment of cattle from area quarantined for splenetic fever.	Verdict of not guilty as to J. S. Woods; combined with case 448 as to Illinois Central R. R. and verdict of guilty returned and fine of $100 imposed.
386	United States Express Co	do	Interstate transportation of a cow from area quarantined for splenetic fever.	Defendant indicted; pending.
387	Chicago, Rock Island & Pacific Ry	Oklahoma, western district	do	Plea of guilty entered and fine of $100 and costs imposed.
388	do	do	do	Do.
389	William Richerson and Lee Thurman	Missouri, western district	Driving cattle interstate from area quarantined for splenetic fever.	Defendants indicted; pending.
390	Southern Ry. and H. C. Creech	South Carolina	Transportation and delivery for shipment of cattle from area quarantined for splenetic fever.	Grand jury failed to indict.
391	do	do	do	Do.
392	Atchison, Topeka & Santa Fe Ry	Texas, northern district	Interstate transportation of cattle from area quarantined for scabies.	Defendant indicted; pending.

Violations of act of March 3, 1905, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912—Continued.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
394	George Heath	Arkansas, eastern district	Driving cattle interstate from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
397	John Pogue, C. E. Pogue, and E. W. Driskell.	Arkansas, western district	do	Defendants indicted; pending.
400	Illinois Central R. R	Illinois, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Plea of guilty entered and fine of $100 and costs imposed.
401	do	do	do	Do.
402	do	do	do	Do.
403	do	do	do	Do.
404	do	do	do	Do.
405	do	do	do	Do.
406	do	do	do	Do.
407	do	do	do	Do.
408	do	do	do	Do.
409	do	do	do	Do.
410	do	do	do	Do.
411	do	do	do	Do.
412	do	do	do	Do.
413	do	do	do	Do.
414	do	do	do	Do.
416	Mobile & Ohio R. R	do	do	Suit filed; pending.
417	do	do	do	Do.
418	do	do	do	Do.
419	do	do	do	Do.
420	do	do	do	Do.
421	do	do	do	Do.
422	do	do	do	Do.
423	do	do	do	Do.
424	do	do	do	Do.
425	do	do	do	Do.
426	do	do	do	Do.
427	do	do	do	Do.
428	do	do	do	Do.
429	do	do	do	Do.
430	do	do	do	Do.
431	Illinois Central R. R	do	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
432	do	do	do	Do.
433	Mobile & Ohio R. R	do	do	Do.
436	Chesapeake & Ohio Ry	Kentucky, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit filed; pending.
437	do	do	do	Do.
438	do	do	do	Do.
439	do	do	do	Do.

440	do.	do.	do.	Do.
441	do.	do.	do.	Do.
442	do.	do.	do.	Do.
443	do.	do.	do.	Do.
444	do.	do.	do.	Do.
445	do.	do.	do.	Do.
446	do.	do.	do.	Do.
447	Western & Atlantic R. R.	Georgia, northern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
448	Illinois Central R. R.	Mississippi, northern district	Interstate transportation of a cow from area quarantined for splenetic fever.	Combined with case 385, and verdict of guilty returned and fine of $100 imposed.
449	Chicago, Rock Island & Pacific Ry.	Arkansas, western district	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
451	Louisville & Nashville R. R.	Kentucky, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit filed; pending.
453	Chesapeake & Ohio Ry.	do.	do.	Do.
454	Mobile & Ohio R. R.	Illinois, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
455	C. L. Hogsed	North Carolina, western district	Driving a cow interstate from area quarantined for splenetic fever.	Defendant indicted; pending.
456	J. H. Ledford	do.	Driving two cattle interstate from area quarantined for splenetic fever.	Do.
457	Chicago, Rock Island & Pacific Ry.	Kansas	Interstate transportation of cattle from area quarantined for splenetic fever.	Plea of guilty entered and fine of $100 and costs imposed.
458	St. Louis & San Francisco R. R.	Missouri, western district	do.	Defendant indicted; pending.
459	Illinois Central R. R.	Illinois, northern district	do.	Do.
461	Mobile & Ohio R. R.	Illinois, eastern district	do.	Plea of guilty entered and fine of $100 and costs imposed.
463	Illinois Central R. R.	do.	do.	Do.
464	do.	do.	do.	Do.
465	St. Louis, Iron Mountain & Southern Ry.	Missouri, eastern district	do.	Suit filed; pending.
466	Illinois Central R. R.	Illinois, eastern district	do.	Plea of guilty entered and fine of $100 and costs imposed.
467	Chesapeake & Ohio Ry.	Ohio, southern district	Interstate transportation of sheep from area quarantined for scabies.	Defendant indicted; pending.
468	Chicago, Rock Island & Pacific Ry.	Missouri, western district	Interstate transportation of cattle from area quarantined for splenetic fever.	Do.
469	Chesapeake & Ohio Ry.	Ohio, southern district	Interstate transportation of sheep from area quarantined for scabies.	Do.
470	do.	do.	do.	Do.
471	do.	do.	do.	Do.
472	do.	do.	do.	Do.
473	do.	do.	do.	Do.
474	do.	do.	do.	Do.
475	do.	do.	do.	Do.
477	John Plummer	Kansas	Driving cattle interstate from area quarantined for scabies.	Suit filed; pending.
479	Cincinnati, New Orleans & Texas Pacific R. R.	Ohio, southern district	Interstate transporation of sheep from area quarantined for scabies.	Do
480	Louisville & Nashville R. R.	do.	do.	Suit dismissed because offense was trivial and technical.

Violations of act of March 3, 1905, reported to the Department of Justice, pending or determined during the fiscal year ending June 30, 1912—Continued.

Case No.	Defendant.	Judicial district.	Offense charged.	Disposition or status of case.
481	Louisville & Nashville R. R., and Chesapeake & Ohio Ry.	Kentucky, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit filed; pending.
482	H. R. Thompson, Hugh Kiser, C. W. Floyd, and S. C. Tucker.	Oklahoma, western district	Driving cattle interstate from area quarantined for splenetic fever.	Suit filed and warrants issued; pending.
484	Louisville & Nashville R. R., and Chesapeake & Ohio Ry.	Kentucky, eastern district	Interstate transportation of sheep from area quarantined for scabies.	Suit filed; pending.
486	Southern Ry	Georgia, southern district	Interstate transportation of a cow from area quarantined for splenetic fever.	Grand jury failed to indict.
487	Seaboard Air Line Ry	Virginia, eastern district	Interstate transportation of cattle from area quarantined for splenetic fever.	Suit filed; pending.
488	do	do	do	Do.
501	Chicago, Rock Island & Pacific Ry	Oklahoma, western district	Interstate transportation of cattle from area quarantined for scabies.	Defendant indicted; pending.
502	William Wasson and George Garrett	Missouri, western district	Driving cattle interstate from area quarantined for splenetic fever.	Defendants indicted; pending.

Cases under meat-inspection amendment of June 30, 1906, reported for prosecution during the fiscal year 1912 and disposed of in that period.

M. I. case No.	Defendant.	Judicial district.	Offense charged.	Disposition.
225	Cudahy Packing Co.	Massachusetts	Unlawful use of meat-inspection labels	Abandoned by United States attorney.
228 229 230	C. J. Lynch	Maine	Shipment of uninspected meats from Maine to Massachusetts, and unlawful use of meat-inspection labels.	Grand jury refused to indict.
231	Guiseppi Brocto	Rhode Island	Transportation of uninspected meats from Connecticut to Rhode Island.	Do.
232	E. Stonzel and R. Stonzel	New York, southern district.	Transportation of uninspected meats from New York to New Jersey	Fined 25 cents.
233	M. S. Rogers	New Jersey	Shipment of immature veal from New Jersey to New York	Grand jury refused to indict.
234	Howard Hahn	Pennsylvania, eastern district.	Transportation of uninspected meats from Pennsylvania to New Jersey.	Fined $5 and costs of $17.40.
238	R. A. Caldwell	Michigan, western district	Shipment of immature veal from Michigan to Illinois	Fined $25.
244	Jacob Martin	New Jersey	Shipment of immature veal from New Jersey to New York	Fined $50.
245	W. J. Flynn	Pennsylvania, western district.	do	Fined $10.
246	L. L. Teeple	Pennsylvania, middle district.	Offering tuberculous meat for shipment from New York, through New Jersey, to New York.	Fined $200.
249	A. M. Aldrich	do	Shipment of immature veal from Pennsylvania to New Jersey	Fined $25 and costs.
250	E. D. Berthoff	do	do	Fined $100 and costs.
251	L. A. Van Cott	do	do	Fined $25 and costs.
254	Kelly & Naylor	do	do	Each of two defendants fined $25 and costs.
259	Raffaele Gatti	Pennsylvania, eastern district.	Offering uninspected meats for shipment from Pennsylvania to New York.	Pleaded guilty; fined 50 cents.
260	John Warner	New Jersey	Shipment of immature veal from New Jersey to New York	Fined $50 and costs.
265	J. H. Kielmeyer	Minnesota	Shipment of immature veal from Minnesota to Illinois	Pleaded guilty; fined $10 and costs.
266	Ernest C. Latourette	Pennsylvania, middle district.	Shipment of immature veal from Pennsylvania to New Jersey	Fined $50 and costs.
271	Roy Gerber	Wisconsin, eastern district	Shipment of immature veal from Wisconsin to Illinois	Pleaded guilty; fined $25.
273	Samuel Wetzler	New Jersey	Transportation of uninspected meats from New Jersey to New York	Grand jury refused to indict.
282	Wm. Oemichen	Wisconsin, eastern district	Shipment of immature veal from Wisconsin to Illinois	Fined $15 and costs.

Cases referred to in previous reports but which were not mentioned therein as being closed.

M. I. case No.	Defendant.	Judicial district.	Offense charged.	Disposition.
34	Edward Rice	Wisconsin, western district	Shipment of immature veal from Wisconsin to Illinois	Pleaded guilty; fined $100.
67	C. G. Stadelman	Washington, eastern district	Shipment of uninspected lard from Washington to Oregon	Verdict for defendant.
97	Schwarzchild & Sulzberger Co.	New York, northern district	Shipment of unsound and unwholesome sausage from New York to Pennsylvania.	Pleaded guilty; fined $300.
98	Hoboken Butchers' Supply Co.	New Jersey	Transportation of immature veal from New Jersey to New York	Frank Fusco fined $50 and sentenced to 20 days' imprisonment.
99	Isadore Lashkovitz	North Dakota	Transportation of uninspected meat from Minnesota to North Dakota.	Pleaded guilty; fined $5.
102	G. B. Cothes	Kentucky, western district	Shipping unsound hog carcass from Kentucky to Illinois	Pleaded guilty; fined $20.
103	W. R. Skeen	West Virginia, northern district.	Transportation of uninspected oleomargarine from West Virginia to Ohio.	Pleaded guilty; fined $25 and costs.
112	Max Neidorff	New York, southern district	Offering for shipment from New York to Connecticut beef fat which was not inspected.	Pleaded guilty; fined $50.
125	A. W. Fisher	Vermont	Shipment of immature veal from Vermont to Massachusetts	Pleaded guilty; fined $100.
130	D. E. Norman	Iowa, northern district	Shipment of immature veal from Iowa to Illinois	Fined $100 and costs.
143	Alpine Butter Co.	New Jersey	Transportation of uninspected oleomargarine from New Jersey to New York.	Verdict for defendant.
144	Frank T. Kearney	Vermont	Shipment of immature veal from Vermont to Massachusetts	Pleaded guilty; fined $50.
150	W. H. Johnson	New Jersey	Shipment of immature veal from New Jersey to New York	Plea of non vult; fined $100.
151	D. E. Norman	Iowa, northern district	Shipment of immature veal from Iowa to Illinois	Consolidated with case No. 152 and plea of guilty; fined $200 and costs.
152	Do	do	do	Consolidated with case No. 151 and plea of guilty; fined $200 and costs.
157	A. H. Panzer	do	Shipment of immature veal from Iowa to Illinois	Fined $100 and costs.
158	J. Hieftje	Michigan, western district	Shipment of immature veal from Michigan to Illinois	Fined $50 and costs.
160	K. Van Dam	do	do	Fined $25.
162	William Better	New Jersey	Offering uninspected oleomargarine for shipment from New Jersey to New York.	Nolle prosequi entered.
163	T. Kissling	Wisconsin, western district	Shipment of immature veal from Wisconsin to Illinois	Fined $50.
164	William Riley	New York, northern district	Shipment of immature veal from New York, through New Jersey, to New York.	Fined $500 and sentenced to 1 year's mprisonment.
166	A. W. Fisher	Vermont	Shipment of immature veal from Vermont to Massachusetts	Pleaded guilty; fined $50.
167	John Rogge	do	do	Dismissed; defendant deceased.
168	Henry Klussman	Wisconsin, western district	Shipment of immature veal from Wisconsin to Illinois	Fined $50.
171	John Rogge	Vermont	Shipment of immature veal from Vermont to Massachusetts	Dismissed; defendant deceased.
173	H. S. Teachout	do	do	Fined $100.
174	Baxter E. Hurlburt	do	do	Fined $50.
178 179	Meyer Abromovitz	Massachusetts	Shipment of uninspected meat from Massachusetts to Rhode Island	Do.
180	Walter Watson	South Dakota	Shipment of immature veal from South Dakota to Illinois	Fined $25 and costs.
182	H. F. Smith	Wisconsin, western district	Shipment of immature veal from Wisconsin to Illinois	Fined $50.
184	John Rogge	Vermont	Shipment of immature veal from Vermont to Massachusetts	Dismissed; defendant deceased.

189	Charles S. Gotschall	Ohio, northern district	Transportation of uninspected veal from West Virginia to Ohio	Pleaded guilty; fined $1,000 and costs.
190	Gus A. Baumann	Wisconsin, eastern district	Shipment of immature veal from Wisconsin to Illinois	Fined $25.
191	John Maphet	New Jersey	Shipment of uninspected oleomargarine from New Jersey to New York.	Grand jury refused to indict.
192	F. J. Kuite	Michigan, western district	Shipment of immature veal from Michigan to Illinois	Pleaded guilty; fined $25.
193	Northwestern Produce Co.	Minnesota	Shipment of uninspected meat from Minnesota to Illinois	Pleaded guilty; fined $75.
194	A. D. Saulsby & Co.	Maine	Unlawful use of meat container	Grand jury refused to indict.
195	Hallock Bros.	Vermont	Shipment of unsound veal from Vermont to Massachusetts	Each defendant fined $50.
196	John Rogge	do	do	Dismissed; defendant deceased.
197	Meses Chapman	Maine	Shipment of immature veal from Maine to Massachusetts	Fined $100 and costs.
198	James Durand	Vermont	Shipment of immature veal from Vermont to Massachusetts	Fined $50.
199	J. L. Springer	New Jersey	Shipment of immature veal from New Jersey through New York to New Jersey.	Grand jury refused to indict.
200	do	New York, southern district.	Shipment of immature veal from New York to New Jersey	Pleaded guilty; sentence suspended.
201	L. Stillwell, jr.	do	Shipment of immature veal from New York through New Jersey to New York.	Fined $10.
202	L. Stillwell, sr.	do	do	Do.
203	John Camp	do	do	Do.
204	Libby, McNeill & Libby	Illinois, northern district	Shipment of immature veal from Illinois to Indiana	Fined $1.
205	A. Lemor	Wisconsin, eastern district	Shipment of immature veal from Wisconsin to Illinois	Fined $10.
206	L. J. Buchanan	New York, southern district.	Shipment of immature veal from New York to New Jersey	Fined $25.
207	P. Murray	do	Shipment of immature veal from New York through New Jersey to New York.	Fined $20.
208	L. Stillwell, sr.	do	do	Fined $10.
211	J. H. Fitzgerald	do	do	Fined $20.
212	W. H. Yingling	Ohio, southern district	Transportation of uninspected meats from West Virginia to Ohio	Grand jury refused to indict.
213	W. Zudeck	New Jersey	Shipment of unsound meats from New Jersey to New York	Fined $50.
214	J. F. Paddleford	New York, northern district.	Shipment of immature veal from New York to New Jersey	Do.
216	Ed. Smith	do	Shipment of immature veal from New York through New Jersey to New York.	Do.
217	Joe Smith	New York, southern district.	do	Verdict for defendant.
218	Joseph D. Schultz	do	do	Fined $250 and sentenced to jail for 6 months.
219	Charles Borkholm	New Jersey	Offering uninspected meats for transportation from New Jersey to New York.	Court directed verdict for defendant.
220	Tony Torito and C. Torito	New York, southern district.	Offering unsound meat for shipment from New York to New Jersey	Pleaded guilty; sentence suspended.
221	Henry W. Juergens	Pennsylvania, eastern district.	Shipment of uninspected meats from Pennsylvania to New Jersey	Fined $5.
222	S. Stillwell	New York, southern district.	Shipment of immature veal from New York through New Jersey to New York.	Fined $10.
223	Johnson Bros	Maine	Shipment of unsound veal from Maine to Massachusetts	Grand jury refused to indict.

Violations of sections 243, 244 Penal Code (the Lacey Act), reported for prosecution during the fiscal year ended June 30, 1912.

L. A. No.	Defendant.	Judicial district.	Nature of offense charged.	Status June 30, 1912.
1	J. N. Adams	Arkansas, eastern district	Shipment from Arkansas to Illinois of 73 wild ducks inu nmarked package.	Acquitted
2	T. H. McGowan	Pennsylvania, western district.	Receipt of consignment of quail exported from Kentucky in violation of law.	Pleaded nolo contendere; fined $50.
3	do	do	do	Pleaded nolo contendere; sentence suspended.
4	do	do	do	Do.
5	do	do	do	Do.
6	do	do	do	Do.
7	Adams Express Co.	Kentucky, eastern district	Transportation from Kentucky to Pennsylvania of quail exported from Kentucky illegally.	Reported to United States attorney.
8	do	do	do	Do.
9	do	do	do	Do.
10	do	do	do	Do.
11	do	do	do	Do.
12	F. P. Jacobs	do	Shipment from Kentucky to Pennsylvania of quail exported from Kentucky illegally.	Do.
13	do	do	do	Do.
14	do	do	do	Do.
15	do	do	do	Do.
16	do	do	do	Do.
17	do	do	do	Do.
18	Adams Express Co.	do	Transportation from Kentucky to Pennsylvania of quail exported from Kentucky illegally.	Do.
19	Alexander & Son	North Carolina, western district.	Shipment of quail from North Carolina to District of Columbia, shipment being prohibited by laws of North Carolina.	Do.
20	D. E. Douglas	do	Shipment of 60 quail from North Carolina to Pennsylvania, shipment being prohibited by laws of North Carolina.	Do.
21	do	do	Shipment of 180 quail from North Carolina to Maryland, export being prohibited by laws of North Carolina.	Do.
22	do	do	Shipment of quail from North Carolina to Pennsylvania, export being prohibited by laws of North Carolina.	Do.
23	Nicholas Neice	Michigan, western district	Shipment of patridges from Michigan to Wisconsin, the killing and shipment being prohibited by the laws of Michigan.	Pleaded guilty; fined $25.
24	G. A. Bergland	do	do	Do.
25	Louis Sjostron	do	Shipment from Michigan to Wisconsin of partridges exported from Michigan illegally.	Do.
26	Harvey Leeman	do	Shipment from Michigan to Illinois of 30 partridges illegally killed and shipped from Michigan.	Indictment returned; plea not guilty; continued to fall term 1912.
27	William Leeman	do	do	Reported to United States attorney.
28	William Vandevere	do	Shipment from Michigan to Illinois of venison and deer hide, export being prohibited by laws of Michigan.	Do
29	United States Express Co	do	do	Do.

30	C. Engels' Sons	District of Columbia	Shipment of quail from District of Columbia to Illinois in an improperly marked package	Pleaded guilty; fined $25.
31	do	do	do	Pleaded guilty; fine included in proceding sentence.
32	Leverage & Bethards	New Jersey	Receipt of 200 quail exported from Kentucky in violation of law	Reported to United States attorney.
33	do	do	Receipt of 30 quail exported from Kentucky in violation of law	Do.
34	Troutdale Produce Co	Virginia, western district	Shipment from Virginia to Pennsylvania of 57 pheasants and 242 quail, export being prohibited by laws of Virginia.	Do.
37	Helen and Norman Sanders	Michigan, western district	Shipment from Michigan to Wisconsin of six beaver skins of beaver killed in violation of Michigan laws.	Do.
38	J. D. Kesecker	West Virginia, northern district.	Shipment from West Virginia to Pennsylvania of quail killed and shipped in violation of laws of West Virginia.	Do.

Cases reported for criminal prosecution under section 2 of the insecticide act of 1910 during the fiscal year ending June 30, 1912, and finally determined, or pending in the courts at its close.

I & F. case No.	Defendant.	Judicial district.	Nature of offense charged.	Disposition or status.
3	Devoe & Raynolds Co.	Illinois, northern district.	Shipment of adulterated and misbranded Paris green from Illinois to Nebraska.	Defendant pleaded guilty; fined $25 and costs.
4	Sherwin-Williams Co.	do.	Shipment of adulterated and misbranded lead arsenate from Illinois to Iowa.	Do.
5	Zenner Disinfectant Co.	Michigan, eastern district.	Shipment of misbranded insecticide from Michigan to Nebraska.	Defendant pleaded nolo contendere; sentence suspended.
7	Devoe & Raynolds Co.	Illinois, northern district.	Shipment of adulterated and misbranded arsenate of lead from Illinois to Nebraska.	Defendant pleaded guilty; fined $25 and costs.
8	do.	Missouri, western district.	Shipment of adulterated and misbranded arsenate of lead from Missouri to Kansas.	Information filed; pending.
9	G. E. Conkey Co.	Ohio, northern district.	Shipment of misbranded insecticide from Ohio to Washington.	Do.
10	Dr. L. D. Le Gear Medicine Co.	Missouri, eastern district.	Shipment of misbranded insecticide from Missouri to Illinois.	Do.
16	G. E. Conkey Co.	Ohio, northern district.	Shipment of misbranded insecticide from Ohio to California.	Do.
17	Carpenter-Morton Co.	Massachusetts.	Shipment of misbranded insecticide from Massachusetts to Wisconsin.	Do.
18	do.	do.	Shipment of misbranded insecticide from Massachusetts to Illinois.	Do.
22	G. E. Conkey Co.	Ohio, northern district.	Shipment of misbranded insecticide from Ohio to Illinois.	Do.
26	G. Hess and J. L. Clark.	do.	Shipment of misbranded insecticide from Ohio to Virginia.	Defendant pleaded guilty; fined $25 and costs.
33	Kentucky Tobacco Product Co.	Kentucky, western district.	Shipment of adulterated and misbranded insecticide from Kentucky to California.	Information filed; pending.
35	Sterling Chemical Co.	Massachusetts.	Shipment of misbranded insecticide from Massachusetts to District of Columbia.	Do.
39	Shoo-Fly Manufacturing Co	Pennsylvania, eastern district.	Shipment of misbranded insecticide from Pennsylvania to District of Columbia.	Defendant pleaded guilty; fined $25.
50	F. A. Thompson & Co.	Michigan, eastern district.	Shipment of misbranded insecticide from Michigan to Nebraska.	Information filed; pending.
55	do.	do.	Shipment of misbranded insecticide from Michigan to Indiana.	Do.

Case under section 10 of the insecticide act of 1910, reported and finally determined during the fiscal year ending June 30, 1912.

I. & F. case No.	Article.	Judicial district.	Charge.	Disposition.
40	3,000 cases of Paris green.	Minnesota.	Misbranded.	Decree of condemnation and forfeiture; goods released on payment of costs and execution of bond.

Applications presented and pending for patents which were prosecuted by the Solicitor for department employees during the fiscal year ending June 30, 1912.

Applicant.	Bureau or office.	Invention.	Disposition of application.
Harry D. Tiemann	Forest Service	Process of drying timber and other moisture-bearing substances.	Patent allowed Feb. 10, 1912.
Alexander G. McAdie	Weather Bureau	Barometer dial converter	Pending.
Frank M. Allen	Chemistry	Machine for testing life of typewriter ribbons.	Patent allowed.
Harry D Tiemann	Forest Service	Process of rapidly drying timber and other moisture-bearing substances.	Patent allowed Feb. 13, 1912.
Chas. H. Hoyt	Public Roads	Method of constructing macadam roads.	Disallowed.
Do	do	Prepared filler and binder for resurfacing parkways, etc.	Do.
Henry L. Walter and Chas. E. Goodrich.	Chemistry	Fat extraction apparatus	Patent allowed.
Mary E. Pennington and Howard C. Pierce.	do	Poultry-cooling rack	Patent allowed Feb. 20, 1912.
Herbert C. Gore	do	Process of treating Japanese persimmons, etc.	Patent allowed Jan. 3, 1912.
Alexander G. McAdie	Weather Bureau	Fruit protector	Patent allowed Feb. 28, 1912.
Harry James Tompkins.	Forest Service	Device for planting seedlings	Patent allowed Apr. 17, 1912.
Charles Frank Sammet and Jason Leslie Merrill.	Chemistry	Process for treating fiber yielding materials.	Patent allowed Jan. 5, 1912.
R. F. Bacon and H. C. Gore.	do	Process for treating fruit juices	Pending.
Wm. F. Conway	Animal Industry	Device for stamping or marking meats.	Patent allowed.
Frank K. Cameron and Richard B. Moore.	Soils	Process for extracting iodine, etc., from the ash of seaweeds and other marine forms of algæ.	Pending.
Frank K. Cameron and W. H. Waggaman.	do	Process for extracting potassium sulphate, etc., from mineral alunite.	Disallowed.
Richard B. Moore	do	Process of drying seaweeds or other marine forms of algæ.	Pending.
Herbert H. Bunzel	Plant Industry	Method for determining the oxidase content of plant juices.	Do.
Theodore H. Scheffer	Biological Survey	Mole trap	Do.
Cy. J. Bingham	Forest Service	Folding plow	Do.
Herbert H. Bunzel	Plant Industry	Oxidase apparatus	Do.
Do	do	Titration apparatus	Do.
Do	do	Thermostat	Do.
Roscoe H. Shaw	Animal Industry	Method of determining the content of butter fat in butter.	Do.
Do	do	Separatory funnels	Do.
Alexander G. McAdie	Weather Bureau	Plant protector	Do.

Miscellaneous cases terminated prior to 1912 and not included in previous reports.

No.	Defendant.	Judicial district.	Offense charged.	Disposition.
5	John R. Jack	Southern Florida	Shipping 2 packages of birds from Florida to New York in improperly marked packages.	Pleaded guilty; fined $1.
6	Arthur J. Harlen	South Dakota	Illegal shipment of game from South Dakota	Pleaded guilty; fined $50.
6a	D. C. Brooks	do	do	Pleaded guilty; sentenced to pay a fine of $50, and in default thereof committed to jail.
6b	do	do	do	Dismissed.
6c	Henry Anderson	do	do	Pleaded guilty; fined $25.
6d	August Tesch	do	do	Do.
6e	Andrew Swanson	do	do	Jury found defendant guilty; fined $25.
8	——— Reziner	Western Kentucky	Shipment of 60 quail from Kentucky to Illinois	Dismissed.
9	John Wilson	Nebraska	Illegal shipment of game from Nebraska to Illinois	Do.
9a	Charles Hall	do	do	Do.
10	F. Carter	Southern Indian Territory	Shipping quail from Indian Territory to New York City	Do.
45	——— Brooks	Wyoming	Assault on Bureau of Animal Industry inspector	Pleaded guilty; fined $50.
37	R. E. Cobb	Minnesota	Violation of act of May 9, 1902 (renovated-butter act)	Pleaded guilty to 2 counts; fined $50 on each count.
73	J. T. Walker	Southern New York	Counterfeiting meat-inspection label	Pleaded guilty; sentence suspended.
98	John and Julian Dupont	Southern Florida	Shooting birds on reservation	Pleaded guilty; fined $10 each.
106	John H. Nickle	Kansas	Shipment of 11 quail from Kansas to Missouri	Pleaded guilty; fined $1 and costs.
107	Robert E. Taylor	Western North Carolina	Making and presenting false claim against the Government	Pleaded guilty; fined $100 and costs.
119	F. L. Kennard	Northern Texas	Making and presenting for approval false claims against the Government.	Pleaded not guilty; convicted by jury and sentenced to pay a fine of $500.
125	William Gaulke	Wisconsin	Forged name on Government check	Pleaded guilty; sentenced to 9 months in jail.

CLAIMS CASES.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912.

DISTRICT NO. 1.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Adair, Iona	H. E. (Coeur d'Alene) 03025.	St. Joe	160 acres, 3,000,000 feet timber	Decision of commissioner favorable to United States affirmed by Secretary.
Allen Co.	M. S. 7871-7877 (Helena) (Legal Tender et al. placers).	Deerlodge	30 acres, 691,650 feet timber.	Referred to chief of field division.
Do	M. A. 5287 (Helena) (McKinley et al. lodes).	do	510.92 acres, 8,149,000 feet timber.	Clear-listed by commissioner.
American Gem Mining Syndicate.	M. A. 192 (Missoula) (Amended Columbine placer).	Missoula	160 acres, 1,750 feet timber	Proceedings dismissed by commissioner; insufficient evidence.
Do	M. A. 194 (Missoula) (Amended Rocky Bar placer).	do	132.34 acres, 400,500 feet timber.	Supplemental report forwarded to commissioner; hearing held.
Ames, Roderick A	H. E. (Coeur d'Alene) 02523.	St. Joe	160 acres, 4,500,000 feet timber	Decision of commissioner directing entry remain intact under provisions of section 1 of act of Mar. 3, 1911
Anderson, C. H., et al.	Mineral location (Coeur d'Alene) (Bell Boy) Group lodes).	Coeur d'Alene	120.36 acres, 3,000,000 feet timber.	Default decision by R. and R.
Anderson, John	H. E. 19280 (Duluth 01131)	Superior	160 acres, 400,000 feet timber.	Answer filed.
Anderson, Joseph E.	D. L. E. 1776 (Miles City)	Custer	160 acres, timber unreported.	Clear-listed by commissioner.
Archibald, Hugh	H. E. 2653 (Missoula 0853)	Missoula	160 acres, 2,200,000 feet timber.	Hearing held.
Auerbach, Geo. S	M. S. 2467 (Coeur d'Alene 03082) (Ivah Group lode claim).	Coeur d'Alene	121.85 acres, 1,025,000 feet timber.	Decision by R. and R. favorable to United States as to Elsie, Cerussite, and Bonanza claims, and favorable to claimant as to Happy Jack claim.
August Mining Co.	(Granger et al. lodes) M. S. 8999 (M. A. Glasgow, now Havre (9697).	Jefferson	97.832 acres, 61,000 feet timber.	Adverse report forwarded chief of field division.
Babbitt, Isaac J.	H. E. 4540 (Coeur d'Alene)	Coeur d'Alene	160 acres, 2,000,000 feet timber.	Decision of R. and R. favorable to United States affirmed by commissioner and entry held for cancellation.
Bard, Henry L.	T. & S. (Coeur d'Alene) 2324.	do	160 acres, 3,000,000 feet timber.	Decision of R. and R. favorable to claimant Apr. 17, 1912.
Basin Mining Co.	M. E. 172 (Missoula) (White Pine et al. lodes).	Missoula	81.69 acres, 700,000 feet timber.	Hearing held.
Beatty, S. B	M. A. 5169 (Helena) (Gold Nuggett and Mammoth placers).	Deerlodge	260 acres, 9,750,000 feet timber.	Decision of Secretary of Interior, affirming decision of commissioner, holding entry for cancellation made final.
Beauchamp, Adelbert	H. E. (Coeur d'Alene) 02474.	Coeur d'Alene	160 acres, 1,500,000 feet timber.	Adverse proceedings directed.
Bennett, William H.	H. E. (Coeur d'Alene) 065	do	160 acres, 2,225,000 feet timber.	Proceedings dismissed by commissioner; insufficient evidence.
Do	H. E. (Coeur d'Alene) 01284.	Kaniksu	Approximately 105 acres, 2,500,000 feet timber.	Decision of R. and R. vacated and rehearing ordered by comsioner.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 1—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Berges, Hiram G.	D. L. E. (Helena) 3441	Jefferson	160 acres, timber unreported.	Appealed by Solicitor, Department of Agriculture.
Berges, Lizzie V.	D. L. E. (Helena) 6739	do	320 acres, timber unreported.	Do.
Bergstrand, Carl	M. S. 7286, M. E. 4624 (Helena) (Final et al. placers).	Deerlodge	408.07 acres, 600,000 feet timber.	Decision of R. and R. favorable to United States.
Bishop, Lon E.	H. E. (Lewiston) 02659	St. Joe	160 acres, 3,200,000 feet timber.	Hearing held.
Bismarck Nugget Gulch Consolidated Mining Co.	M. E. 4661 (Helena) (Deepdale lode).	Madison	Approximately 20 acres, 5,000 feet timber.	Canceled by commissioner.
Black Hawk Mining Co.	M. E. 271 (Bozeman) (Sixteen to One et al. lodes).	do	16 acres, 9,000 feet timber	Proceedings dismissed by commissioner.
Blashill, J. W.	D. L. E. 3981 (Helena)	Jefferson	160 acres, timber unreported.	Decision of commissioner affirmed by Secretary and entry canceled.
Boal, Mrs. Arta Cody	D. L. E. (Miles City) 03523	Custer	320 acres, 1,314,265 feet timber.	Adverse report forwarded to chief of field division.
Boucher, Nelson	H. E. (Coeur d'Alene) 02510	St. Joe	160 acres, 5,000,000 feet timber.	Commissioner directs issuance of final certificate.
Boucher, Wilfred	H. E. (Coeur d'Alene) 02530	do	do	Claimant appealed to commissioner.
Boucher, Joseph	H. E. (Coeur d'Alene) 02531.	do	160 acres, 4,000,000 feet timber.	Adverse proceedings directed.
Bowman, Sarah Annette	H. E. (Coeur d'Alene) 02513	do	160 acres, 3,500,000 feet timber.	Claimant appealed to commissioner.
Branson, George A.	H. E. (Coeur d'Alene) 02532	do	160 acres, 5,000,000 feet timber.	Decision of R. and R. favorable to claimant.
Braun, Thomas J.	H. E. (Lewiston) 02606	do	160 acres, 4,500,000 feet timber.	Adverse report forwarded to chief of field division.
Braune, Genevieve G.	H. A. (Coeur d'Alene) 07426	Coeur d'Alene	160 acres, timber unreported.	Answer filed.
Brett, George A.	H. E. 4541 (Coeur d'Alene)	do	160 acres, 2,000,000 feet timber.	Decision of R. and R. affirmed by commissioner and entry held for cancellation.
Broadwell, Hazel	H. E. (Coeur d'Alene) 02487	St. Joe	160.36 acres, timber unreported.	Commissioner holds proceedings for dismissal unless further evidence is submitted within 30 days.
Brown, James A.	H. E. (Coeur d'Alene) 0197	Pend Oreille	120 acres, 900,000 feet timber.	Claimant appealed to commissioner.
Brown, Margaret C.	H. E. (Coeur d'Alene) 4237	do	150 acres, 2,000,000 feet timber.	Decision of R. and R. favorable to claimant.
Bryan, William	H. E. (Missoula) 0913	Lolo	160 acres, 1,000,000 feet timber.	Hearing held.
Bunker Hill & Sullivan Mining & Concentrating Co.	M. A. (Coeur d'Alene) 07922, M. S. 2587 (Yreka group).	Coeur d'Alene	248,882 acres, no timber	Adverse report forwarded to chief of field division.
Burke, John H.	M. A. (Helena) 5322 (Dorothy Snow and Mollie Snow lodes).	Deerlodge	17.58 acres, 50,000 feet timber.	Reinvestigation directed by commissioner.
Burkett, Catherine I	D. L. E. (Helena) 8338	Beaverhead	320 acres, timber unreported.	Commissioner affirmed decision of R. and R. favorable to claimant and dismissed proceedings.

Burns, Charles E.	M. A. (Missoula) 0332 (Bryan et al. lodes).	Lolo	197.79 acres, 2,005,500 feet timber.	Commissioner canceled Tam O'Shanter lode and approved remainder of group for patent.
Burris, John (heirs of)	Squatter (Lewiston)	Jefferson	120 acres, timber unreported.	Decision of R. and R. favorable to United States affirmed by commissioner and entry held invalid.
Burzynski, Joseph L.	H. E. (Coeur d'Alene) 02511	St. Joe	146.19 acres, 4,000,000 feet timber.	Adverse report forwarded to chief of field division.
Bush, Walker N.	F. S. L. S. (Helena) 3458	Helena	160 acres, timber unreported.	Charges amended.
Butterfield, Duane	D. L. E. (Helena) 3442	Jefferson	do	Pending action by commissioner on report of special agent.
Butte Oil Co.	M. A. (Kalispell) 30 (Excess No. 2 and Lake No. 11 placer locations).	Blackfeet	99.30 acres, 400,000 feet timber.	Decision of R. and R. favorable to United States affirmed by commissioner.
Butte Water Co.	M. S. (Helena) 8634 (Highland placer).	Deer Lodge	122.555 acres, 3,000,000 feet timber.	Hearing held.
Calkins, May	H. E. (Coeur d'Alene) 01775.	St. Joe	160 acres, 2,250,000 feet timber.	Held for cancellation by commissioner.
Calumet & Montana Mining Co.	M. A. (Missoula) 0745 (Dark Horse No. 1 et al. lodes).	Beaverhead	118.529 acres, timber unreported.	Commissioner directs chief of field division to make investigation.
Carey, Thomas E.	H. E. (Missoula) 3031	Missoula	160 acres, timber unreported.	Supervisor submits favorable report.
Carroll, Eugene, et al.	M. A. 5531 M. S. 8732 (Helena) (Stone placer).	Deerlodge	49.115 acres, timber unreported.	Action deferred by commissioner pending determination of private contest.
Catheart, Loftas L.	H. A. (Coeur d'Alene) 07437.	Coeur d'Alene	160 acres, 2,000,000 feet timber.	Answer filed.
Catron, A. E.	D. L. E. (Helena) 3975	Helena	160 acres, no timber	Decision of R. and R. favorable to claimant.
Chainey, Benjamin	H. E. (Coeur d'Alene) 02526.	St. Joe	160 acres, 5,000,000 feet timber.	Decision of R. and R. favorable to United States.
Cheney, Honoria	D. L. E. (Helena) 3365	Jefferson	Approximately 300 acres, timber unreported.	Appealed to Secretary by Solicitor, Department of Agriculture.
Christie, Mary (heir of Hugh Christie).	H. E. (Helena) 14768	Deer Lodge	160 acres, 9,600 feet timber	Proceedings dismissed by commissioner.
Clarke, C. W.	L. S. (Missoula) 620	Bitterroot	640 acres, timber unreported.	Adverse proceedings directed by commissioner.
Do	L. S. (Miles City) 4146	Custer	120 acres, timber unreported.	Adverse proceedings directed on amended charges.
Cleary, John E.	H. E. (Coeur d'Alene) 07792.	Coeur d'Alene	160 acres, timber unreported	Adverse report to chief of field division.
Clem, Noah R.	H. E. (Coeur d'Alene) 0348	St. Joe	175.44 acres, 2,600,000 feet timber.	Decision of R. and R. affirmed by commissioner and proceedings dismissed.
Clinton, William	H. E. (Missoula) 03122	Cabinet	160 acres, 900,000 feet timber.	Adverse report forwarded to chief of field division.
Coates, Crawford	H. E. (Lewiston) 11906	St. Joe	160 acres, 1,280,000 feet timber.	Commissioner affirms decision of R. and R. favorable to claimant and approves entry for patent.
Coates, Palgrave	H. E. (Lewiston) 11907	Coeur d'Alene	160 acres, 1,280,000 feet timber.	Entry canceled by commissioner.
Collins, Peter M.	L. S. (Helena) 2889	Jefferson	120 acres, timber unreported.	Adverse proceedings directed by commissioner.
Do	L. S. (Kalispell) 1765	Flathead	160 acres, timber unreported.	Proceedings suspended and reinvestigation directed.
Condon, Richard N.	H. E. (Lewiston) 01914	St. Joe	155.35 acres, timber unreported.	Entry canceled by commissioner.
Cook, Fern M.	D. L. E. (Helena) 7994	Jefferson	160 acres, 75,000 feet timber	Commissioner directs hearing to determine rights of Holliday and Cook.
Cook, Garret A.	D. L. E. (Helena) 0741	do	200 acres, no timber	Final certificate authorized by commissioner.
Cook, George F.	H. E. (Coeur d'Alene) 01489.	Pend Oreille	160 acres, 3,086,700 feet timber.	Canceled by commissioner.
Copper King Mining & Development Co.	M. S. 8989, M. A. (Great Falls) (Copper King et al. lodes).	Jefferson	256.194 acres, 249,000 feet timber.	Adverse report to chief of field division.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 1—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Corry, A. V.	M. E. (Helena) 4664 (Usov et al lodes).	Deer Lodge	47.86 acres, 300,000 feet timber.	By decision commissioner entry held for cancellation as to King Dodo lode and proceedings dismissed as to other claims.
Costa, Albert R.	H. E. (Lewiston) 9916	St. Joe	160 acres, 1,500,000 feet timber.	Decision of R. and R. favorable to claimant.
Cox, J. A. W.	H. E. (Lewiston) 02643	do	160 acres, timber unreported.	Entry reinstated under act Mar. 3, 1911.
Crooks, Maud	H. E. (Missoula) 2253	Bitterroot	Approximately 160 acres, 10,000 feet timber.	Adverse proceedings directed by commissioner.
Darrock, A. V.	H. E. (Bozeman) 7138	Absaroka	80 acres, 150,000 feet timber.	Decision of R. and R. affirmed by commissioner and proceedings dismissed.
Daugherty, Joseph	H. E. (Coeur d'Alene) 02505.	St. Joe	160 acres, 3,000,000 feet timber.	Appeal from decision of R. and R. filed by claimant.
Daveggio, John	H. E. (Coeur d'Alene) 0823	do	160 acres, 6,000,000 feet timber.	Decision of R. and R. recommending dismissal of protest; land in school section surveyed before creation of forest. (R. and R. decision affirmed by commissioner.)
Davis, Elizabeth (née McPhee).	H. E. (Coeur d'Alene) 02545.	do	160 acres, 3,500,000 feet timber.	Decision of R. and R. favorable to United States affirmed by commissioner.
Davis, Samuel T.	H. E. (Coeur d'Alene) 1360	Kaniksu	160 acres, 3,000,000 feet timber.	Decision of R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Dayton, Nancy J.	H. E. (Missoula) 0478	Bitterroot	160 acres, 2,000,000 feet timber.	Appeal filed by Solicitor, Department of Agriculture.
Demorest, A. J.	H. E. (Coeur d'Alene) 07499.	Coeur d'Alene	160 acres, 1,500,000 feet timber.	Clear listed by commissioner.
Des Jardins, Alphonse	H. E. (Coeur d'Alene) 0262	do	160 acres, timber unreported.	Hearing held.
Des Voignes, Louis E.	H. E. (Lewiston) 02808	St. Joe	160 acres, timber unreported.	Entry held for cancellation by commissioner.
Downey, Jeremiah	H. E. (Kalispell) 1929	Kootenai	Approximately 160 acres, 1,600,000 feet timber.	Hearing held.
Downey, John P.	H. E. (Kalispell) 1930	do	do	Do.
Driscoll, Kathryn	H. E. (Lewiston) 02647	St. Joe	160 acres, timber unreported.	New report submitted to chief of field division.
Dykeman, Carrie M.	T. & S. (Missoula) 2458	Missoula	160 acres, 250,000 feet timber.	Canceled by commissioner.
Earley, Lewis B.	D. L. E. (Miles City) 05638	Custer	160 acres, timber unreported.	Adverse proceedings directed.
Earley, Maude Araana	H. E. (Coeur d'Alene) 02501.	St. Joe	160 acres, 5,000,000 feet timber.	Adverse report forwarded to chief of field division.
Eby, Lucian L. (attorney in fact).	M. S. 8885 M. E. 0655 (Missoula) (Big Ship et al. placers.)	Beaverhead	640 acres, 475,000 feet timber.	Adverse proceedings directed.
Eclipse Argo Mining Co.	M. A. 5305 M. S. 8540-1 (Helena) (Jersey & Helena lodes).	Helena	36.073 acres, 8,000 feet timber.	Canceled by commissioner.
Edmundson, William A.	H. E. (Lewiston) 0941	St. Joe	120 acres, 800,000 feet timber.	Do.
Edwards, Townsend	H. E. (Missoula) 0828	Bitterroot	160 acres, 400,000 feet timber.	Entry canceled by relinquishment.
Eidem, Thomas	Mineral location (Glasgow) (Dollie lode claim).	Jefferson	Approximately 20 acres, 7,500 feet timber.	Decision R. and R: by default affirmed by commissioner.

Eldem, Thomas, et al	Mineral location (Glasgow) (Sediment lode).	do	20 acres, 10,000 feet timber	Do.
Elfveen, Lim A	D. L. E. (Helena) 8619	do	160 acres, timber unreported.	Proceedings dismissed by commissioner.
Ensign, Edgar A	H. E. (Missoula) 094	Bitterroot	166.10 acres, 1,500,000 feet timber.	Hearing held.
Evans, Durgan	H. E. (Coeur d'Alene) 0966	Coeur d'Alene	160 acres, 3,000,000 feet timber.	Decision R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Fallon, Joseph P	H. E. (Coeur d'Alene) 02519	St. Joe	160 acres, 5,000,000 feet timber.	Appeal filed by claimant.
Fergus Mining Co	M. S. 8862, M. A. 01882 (Helena) (Edgar et al. lodes).	Jefferson	112.4 acres. No timber	Hearing held.
Do	M. E. (Glasgow) 01109 (Medford et al. lodes).	do	96.792 acres, 5,000 feet timber.	Do.
Do	M. E. (Glasgow) 01884 (Water Rose lode).	do	18.285 acres, 60,000 feet timber.	Do.
Fertig, Ina B	H. E. (Lewiston) 02605	St. Joe	160 acres. Timber unreported.	Report requested by commissioner.
Fields, Mary (widow of Fred Fields).	H. E. (Lewiston) 01924	do	160 acres, 1,280,000 feet timber.	Decision of R. and R. by default favorable to claimant.
Fishhawk Consolidated Gold Mining Co.	M. E. (Lewiston) 88 (Fishhawk et al. lodes).	Nez Perce	143.901 acres, 467,500 feet timber.	Hearing held.
Follet, Elwin B	H. E. (Marquette) 01990	Michigan	160 acres, timber unreported.	Entry validated by act of Mar. 3, 1911.
Fulkerson, Edwin V	H. E. (Coeur d'Alene) 4920	Coeur d'Alene	160.38 acres, 1,800,000 feet timber.	Decision R. and R. favorable to claimant reversed by commissioner and entry held for cancellation.
Fullerton, Wyn	H. E. (Missoula) 0821	Bitterroot	160 acres, 500,000 feet timber.	Favorable report forwarded to chief of field division.
Galloway Group Mining Co	M. E. (Helena) 4928 (Pennsylvania, Last Chance, and Little Jane lodes).	Madison	38.028 acres, 76,900 feet timber.	Proceedings dismissed by commissioner.
Gareau, Frank	M. A. (Missoula) 01231 M.E. 85189 (Hopeful placer).	Lolo	96.213 acres, 401,350 feet timber.	Do.
Gerry, H. M., jr., et al	M. A. (Helena) 5131 (Bedrock placer).	Helena	152.57 acres, timber unreported.	Reinvestigation by chief of field division directed by commissioner.
Gleason, Geo. A	H. E. (Lewiston) 02666	St. Joe	160 acres, 1,280,000 feet timber.	Entry held for cancellation by commissioner.
Golden Chest Mining Co	M. S. 2333 M. A. (Coeur d'Alene) 07989 (Florence et al. lodes).	Coeur d'Alene	57.162 acres, 1,100,000 feet timber.	Adverse report forwarded to chief of field division.
Glidden, S. S	M. S. 1791 M. E. (Lewiston) 73 (Lucky Boy lode).	Nez Perce	Acreage unreported, timber unreported.	Decision of R. and R. favorable to United States reversed, remanded, and hearing ordered by commissioner.
Goslin, Louis	Squatter (Glasgow)	Jefferson	160 acres, 2,500 feet timber	Proceedings dismissed by commissioner.
Gragg, Charles	H. E. (Coeur d'Alene) 3905	St. Joe	160 acres, 200,000 feet timber.	Decision R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Grice, Frank E	H. E. (Lewiston) 02652	do	160 acres, 2,880,000 feet timber.	Adverse proceedings directed by commissioner.
Grice, Glen O	H. E. (Lewiston) 02460	do	do	Appeal filed by claimant.
Griffith, Della E	H. E. (Lewiston) 02657	do	160 acres, 5,000,000 feet timber.	Adverse report forwarded to chief of field division.
Groom, Alice	H. E. 9632 (Lewiston)	Nez Perce	140 acres, 1,050,000 feet timber.	Decision of commissioner sustains decision R. and R. and holds entry for calcellation; Appeal filed by claimant March, 1912.
Hall, Andrew F	H. E. (Coeur d'Alene) 02538	St. Joe	80 acres, 2,500,000 feet timber.	Hearing held.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 1—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Hall, Ellen M	H. E. (Coeur d'Alene) 02115.	Pend Oreille	153.95 acres, timber unreported.	Entry held for cancellation by commissioner.
Hall, Matilda H	D. L. E. (Lewiston) 01034	Nez Perce	Approximately 240 acres, no timber.	Hearing set for Dec. 12, 1911, but indefinitely postponed Nov. 18, 1911, pending amendment of entry.
Hansen, Even H	M. A. 0797 (Lewiston) (Key West et al. lodes).	do	61.951 acres, 88,000 feet timber.	Decision R. and R. favorable to claimant affirmed by commissioner.
Harpold, Adam	H. E. (Coeur d'Alene) 2581	Pend Oreille	160 acres, 850,000 feet timber.	Canceled by commissioner.
Hauan, Albert S	T. & S. (Lewiston) 6012	St. Joe	160 acres, 1,800,000 feet timber.	Closed on account of insufficient evidence.
Hellar, Frank and George	Mineral location (Coeur d'Alene) (Heller Group placers.	Coeur d'Alene	39 acres, 80,000 feet timber	Adverse report to chief of field division.
Hellman, Harriet L	H. E. (Missoula) 3114.	Missoula	160 acres, 700,000 feet timber.	Held pending private contest filed.
Hicks, Marion T	H. E. (Coeur d'Alene) 0357	St. Joe	160 acres, 2,000,000 feet timber.	Proceedings dismissed by commissioner; insufficient evidence.
Higgins, W. I., et al	M. S. 9121 M. A. (Helena) 05937 (Snowdrift lode).	Madison	20.661 acres, timber unreported.	Adverse report forwarded to chief of field division.
Hill, Charles A	H. E. (Coeur d'Alene) 4568	Coeur d'Alene	160 acres, 4,500,000 feet timber	Favorable report forwarded to chief of field division.
Hinkle, G. W., et al	M. E. (Lewiston) 67 (Francis placer).	Nez Perce	38.963 acres, 30,000 feet timber.	Decision commissioner holding entry for cancellation affirmed by Secretary
Holliday, Sanford M	D. L. E. (Helena) 02418.	Jefferson	160 acres, timber unreported.	Hearing postponed pending private contest.
Hollis, Joseph O	H. E. (Spokane)'17870	Kaniksu	160 acres, 1,000,000, feet timber.	Patent issued.
Holmes, Ambrose	H. E. (Belle Fourche) 02889	Sioux	160 acres, 84,600 feet timber	Adverse report forwarded to chief of field division.
Holmes, Cyril T	T. & S. (Duluth) 08266	Superior	171.12 acres, timber unreported.	Claimant appealed from decision of commissioner.
Home Mining Co	M. S. 8968 M. A. (Helena) 03429 (Board of Trade et al. lodes).	Jefferson	81.065 acres, 105,000 feet timber.	R. and R. recommends dismissal of charges against Parnell and Board of Trade claims, and the rejection of the application for the Remainder and Maud B. claims.
Hopp, Katie	D. L. E. (Missoula) 494	Beaverhead	160 acres, no timber	Hearing held.
Horst & Powell	M. E. (Coeur d'Alene) 558 (Sunset and August lodes and Sunset millsite).	Coeur d'Alene	7.5 acres, 53,500 feet timber	Decision R. and R. favorable to United States affirmed by commissioner and entry canceled to extent of millsite.
Hough, Alma	H. E. (Spokane) 17760	Kaniksu	160 acres, 1,000,000 feet timber.	Decision of commissioner favorable to claimant.
Howe, Obidiah J	H. E. (Coeur d'Alene) 01860.	Pend Oreille	160 acres, 300,000 feet timber.	Relinquished by claimant.
Hultman, Louis	H. E. (Coeur d'Alene) 0731	Coeur d'Alene	160 acres, timber unreported.	Applicant appealed to Secretary.
Hump Fold Mining Co	M. E. (Lewiston) 81 M. S. 1490 (Fraction and Daisy consolidated lodes).	Nezperce	Acreage unreported, timber unreported.	Decision of R. and R. favorable to United States by default reversed by commissioner, remanded, and hearing ordered.

Huntback, Thomas J.	H. E. (Lewiston) 01929	St. Joe	160 acres, 1,500,000 feet timber.	Proceedings dismissed and final certificate authorized by commissioner.
Hyde, F. A.	L. S. (Lewiston) 836	do	1,120 acres, timber unreported.	Adverse proceedings directed under substituted charges.
Do	L. S. (Missoula) 1329	Lolo	1,600 acres, timber unreported.	Notice of charges issued.
Hyde, F. A., and Collins, Peter M.	L. S. (Helena) 04188	Jefferson	80 acres, timber unreported.	Adverse proceedings directed.
Hyde, F. A., & Co	L. S. (Missoula) 3027	Lolo	160 acres, timber unreported.	Notice of charges issued.
Do	L. S. (Missoula) 3346	do	960 acres, timber unreported.	Supplemental report required of chief of field division.
Do	L. S. (Missoula) 0369	do	40 acres, timber unreported.	Notice of charges issued.
Hyde, F. A.	L. S. (Great Falls) 3394	Jefferson	80 acres, timber unreported.	Adverse proceedings directed.
Hyde, F. A., & Co	L. S. (Kalispell) 3557	Flathead	160 acres, timber unreported.	Do.
Hyde, F. A.	L. S. (Missoula) 0701	Lolo	40 acres, timber unreported.	Notice of charges issued.
Hyde, F. A., & Co	L. S. (Kalispell) 4013	Flathead	400 acres, timber unreported.	Adverse proceedings directed.
Hyde, F. A.	L. S. (Lewiston) 4679	St. Joe	40 acres, timber unreported.	Adverse proceedings directed under substituted charges.
Hyde, F. A., Chas. E. Conrad, attorney in fact.	L. S. (Kalispell) 5392	Blackfeet	160 acres, timber unreported.	District Forester reports land now within Glacier National Park.
Hyde, F. A.	L. S. (Kalispell) 5509	Flathead	80 acres, timber unreported.	Adverse proceedings directed.
Hyde, F. A., & Co	L. S. (Kalispell) 5592	Kootenai	do	Do.
Do	L. S. (Kalispell) 5596	Flathead	do	Adverse proceedings directed under substituted charges.
Hyde, F. A.	L. S. (Missoula) 5662	Lolo	360 acres, timber unreported.	Adverse proceedings directed.
Hyde, F. A., & Co	L. S. (Missoula) 7004	do	320 acres, timber unreported.	Notice of charges issued.
Illinois & Montana Mining Co.	M. A. (Missoula) 02491, M. S. 7369 (Giant and Sentinel placers).	Kootenai	17.87 acres, 115,000 feet timber.	Adverse proceedings directed.
Ingraham, Jesse W.	H. A. (Coeur d'Alene) 07434.	Coeur d'Alene	175.27 acres, 3,500,000 feet timber.	Adverse report forwarded to chief of field division.
Jamison, James M., et al.	M. E. (Helena) 4804 (Cottonwood placer).	Deerlodge	100 acres, 1,000,000 feet timber.	Appeal filed by claimant from decision R. and R.
Jefferson Lime Co.	M. E. (Helena) 4990 (Pipestone placer).	do	158 acres, 1,000,000 feet timber.	Decision of R. and R. favorable to United States by default.
Johns, Clarence E.	H. E. (Missoula) 0796	Bitterroot	160 acres, 80,000 feet timber.	Canceled by commissioner on account of failure of claimant to submit proof within statutory period.
Johnson, Andre	H. E. (Duluth) 04876	Superior	150 acres, 285,000 feet timber.	Adverse report forwarded to chief of field division.
Kester, Mithra J.	H. E. (Great Falls) 07110	Jefferson	200 acres, timber unreported.	Entry held for cancellation by commissioner; action deferred pending application under act June 11, 1906.
Killian, Henry	D. L. E (Helena) 8063	Deerlodge	120 acres, 6,000 feet timber.	Decision R. and R. favorable to United States.
Kirkendall, Ashley (Mark Kirkendall, heir).	H. E. (Great Falls) 264	Jefferson	160 acres, timber unreported.	Answer filed.
Klein, Fritz (Adolph Klein, transferee).	T. & S. (Duluth) 10841	Superior	165.65 acres, timber unreported.	Proceedings dismissed by commissioner.
Knight, George	D. L. E. (Bozeman) 1650	Absaroka	160 acres 1,000 feet timber.	Decision R. and R. holding entry for cancellation affirmed by commissioner.
Knowlton, Frank W.	Squatter	Coeur d'Alene	160 acres, 1,000,000 feet timber.	Case remanded for hearing by commissioner.
Kulp, Arthur J.	H. E. (Coeur d'Alene) 07475.	do	160 acres, 3,500,000 feet timber.	Adverse report forwarded to chief of field division.
Lanagan, John	T. & S. (Duluth) 11601	Superior	120 acres, timber unreported.	Appeal filed by claimant from decision of commissioner, holding entry for cancellation.
Landusky, Julia	D. L. E. (Glasgow) 01308	Jefferson	160 acres, timber unreported.	Canceled by commissioner on account of claimant's failure to make application for hearing.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 1—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Larsen, Joseph, et al	M. A. (Helena) 5361, M. S. 8776 (Bessie placer).	Deerlodge	140 acres, timber unreported.	Commissioner affirms decision of R. and R. of canceling east forty acres and dismissing proceedings as to the remainder.
Lasalle, Samuel	H. E. (Coeur d'Alene) 02520.	St. Joe	160 acres, 3,000,000 feet timber.	Decision R. and R. favorable to claimant affirmed by commissioner.
Laundry, Joseph	H. E. (Missoula) 3033	Lolo	120 acres, 491,000 feet timber.	Adverse proceedings directed by commissioner.
Lee, Norman	H. E. (Kalispell) 1925	Flathead	120 acres, 800,000 feet timber.	Entry approved for patent by commissioner.
Libby Placer Mining Co	M. A. (Missoula) 173 (Libby placers).	Kootenai	10,000 acres, 17,000,000 feet timber.	Application canceled in part by commissioner.
Lilly, Charles E	H. E. (Lewiston) 9649	St. Joe	160 acres, 2,500,000 feet timber.	Canceled by commissioner.
Lindsay, Charles, and Kimball, Evelyn.	M. A. (Great Falls) 023995 (Concrete placer).	Jefferson	40 acres, timber unreported.	Adverse proceedings directed.
Lumsden, Clinton	H. E. (Marquette) 11501	Marquette	160 acres, 250,000 feet timber.	Canceled by commissioner.
Lumsden, George	H. E. (Marquette) 11485	do	160 acres, 300,000 feet timber.	Adverse report forwarded to chief of field division.
Lundquist, Lyn	H. E. (Coeur d'Alene) 01789.	St. Joe	160 acres, timber unreported.	Do.
McBride, Rudolph	H. E. (Missoula) 2755	Lolo	120 acres, 1,260,000 feet timber.	Hearing held.
McGregor, Charles D	H. E. (Missoula) 02607	St. Joe	160 acres, 4,000,000 feet timber.	Appeal filed by claimant from decision of R. and R.
McIntosh, Nora	H. E. (Spokane) 17714	Kaniksu	160 acres, 600,000 feet timber.	Proceedings dismissed by commissioner.
Martin, Ozella (widow of Addilor Martin).	H. E. (Coeur d'Alene) 0523	Coeur d'Alene	160 acres, 2,500,000 feet timber.	Patented.
Mountain Gem Mining Co	M. A. (Missoula) 0346 (May Day et al. lodes).	Lolo	276.323 acres, 2,536,323 feet timber.	Hearing held.
Mayo, David P	T. & S. (Missoula) 2575	Lolo	120 acres, 600,000 feet timber.	Adverse report forwarded to chief of field division.
Mead, Bert H	H. E. (Spokane) 17712, C. E. 6646.	Kaniksu	160 acres, 1,000,000 feet timber.	Secretary directs cancellation of cash entry and rejection of commutation proof; holds entry intact subject to future compliance.
Mendy, John G	L. S. (Coeur d'Alene) 02313	St. Joe	160 acres, timber unreported.	Commissioner canceled selection as to part and approved remainder for patent.
Mettler, F. W., et al	M. A. (Helena) 04832 (Crisscross et al. lodes).	Helena	59.715 acres, 30,000 feet timber.	Decision R. and R. favorable to claimants.
Miles, Rodolphus	H. E. (Coeur d'Alene) 02515.	St. Joe	159.30 acres, 5,000,000 feet timber.	Decision R. and R. favorable to claimant.
Miller, Henry A	H. E. (Coeur d'Alene) 01729.	Coeur d'Alene	160 acres, timber unreported.	Relinquished.
Milton, Ella (for heirs of Walter Milton).	H. E. (Kalispell) 1862	Blackfeet	160 acres, 1,000 feet timber	Decision of commissioner holding entry for cancellation affirmed; settlement remaining intact subject to future compliance.
Mitchell, Anna S	H. E. (Coeur d'Alene) 02506.	St. Joe	160 acres, 4,500,000 feet timber.	Appeal filed by claimant from decision R. and R.
Mix, Mary H	H. E. (Lewiston) 02658	do	160 acres, 4,000,000 feet timber.	Adverse report forwarded to chief of field division.

Monson, Charles	H. E. (Lewiston) 11888 F. C. 6490.	do	160 acres, 1,280,000 feet timber.	Proceedings dismissed by commissioner.
Montfort, Frank	H. A. (Coeur d'Alene) 07421.	Coeur d'Alene	160 acres, 3,000,000 feet timber.	Answer filed.
Montgomery, Alexander	H. E. (Missoula) 2935	Lolo	160 acres, 1,000,000 feet timber.	Commissioner rejects commutation proof and holds entry intact.
Morris, H. M	L. S. (Missoula) 579	Bitterroot	1,000 acres, timber unreported.	Proceedings suspended and reexamination directed.
Morris, William C	M. S. (Helena) 0307 (M. K. & T. lode).	Madison	9.594 acres, timber unreported.	Decision R. and R. adverse to United States.
Morrison, J. W., et al	M. E. (Coeur d'Alene) 663 (Rex et al. lodes).	Pend Oreille	67.837 acres, 650,000 feet timber.	Decision R. and R. favorable to United States.
Musselshell Mining Co	M. A. (Lewiston) 0830, M. S. 2377 (Musselshell group placers).	Clearwater	2,310 acres 28,966,540 feet timber.	Stipulation of parties confirmed by commissioner and application rejected in part and proceedings dismissed as to remainder.
Nash, Maurice	H. E. (Coeur d'Alene) 01600.	St. Joe	160 acres, 2,000,000 feet timber.	Decision R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Nelson, W. D	H. E. (Coeur d'Alene) 07790.	Coeur d'Alene	do	Adverse report forwarded to chief of field division.
New World Reduction & Power Co.	M. A. (Bozeman) 021, M. S. 7899 and 7898 (Cascade and Tanzer lodes).	Beartooth	Approximately 20 acres, 340,000 feet timber.	Decision of R. and R. favorable to United States by default affirmed by commissioner.
Nihill, Margaret	D. L. E. (Helena) 7282	Jefferson	160 acres, timber unreported.	Appealed by Solicitor, Department of Agriculture.
Northern Pacific lands	L. S. (Lewiston)	Clearwater	3,480 acres, timber unreported.	Decision commissioner holding entry for cancellation affirmed by Secretary.
O'Brien, W. H	M. A. (Missoula) 197 (Montana Bar placer).	Lolo	160 acres, 5,600,000 feet timber.	Default decision of R. and R. remanded for new service of notice of adverse decision. Served.
O'Connors, T. B	Mineral Location (Coeur d'Alene) (Kentucky Belle lode).	St. Joe	Approximately 20 acres, 180,000 feet timber.	Decision R. and R. favorable to United States by default affirmed by commissioner and location declared invalid.
O'Dennel, Fred	M. S. 9159, M. A. (Helena) 05106 (Whitetail placer).	Deerlodge	160 acres, timber unreported.	Answer filed.
Oleson, John	Squatter (Coeur d'Alene)	Coeur d'Alene	160 acres, 4,000,000 feet timber	Claim held invalid by commissioner.
Oom Paul Consolidated Mining Co.	M. A. (Coeur d'Alene) 0577 M. S. 2378 (Snow Shoe group, Forgetmenot et al. lodes).	do	71.794 acres, 170,000 feet timber.	Decision R. and R. favorable to claimant.
Patnod, Edward F	H. E. (Rapid City) 7244	Sioux	160 acres, timber unreported.	Canceled by commissioner.
Pemberton, Charles D	H. A. (Coeur d'Alene) 07432.	Coeur d'Alene	160 acres, 3,000,000 feet timber.	Answer filed.
Pemberton, Robert L	H. A. (Coeur d'Alene) 07431.	do	do	Adverse report forwarded to chief of field division.
Peterson, Christina Hanna	H. E. (Coeur d'Alene) 02002.	St. Joe	160 acres, timber unreported.	Cnceled by commissioner.
Pohold, Michael	D. L. E. (Great Falls) 18	Jefferson	do	Decision R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Pollinger, E. M	M. E. (Helena) 4964 (Alaska No. 2 and Amended Alaska lodes).	Madison	Approximately 29.71 acres, 3,049 feet timber.	Canceled by commissioner.
Pratt, J. W	M. A. (Missoula), 092, M. S. 8517 (Joseph Creek placer).	Beaverhead	150 acres, 72,500 feet timber	Adverse proceedings directed.
Price, William L	H. E. (Missoula) 2806	Bitterroot	160 acres, 200,000 feet timber.	Canceled by commissioner.
Purdy, Lucy	H. E. (Coeur d'Alene) 46222, F. C. 2536.	Coeur d'Alene	160.70 acres, 750,000 feet timber.	Decision R. and R. favorable to claimant reversed by commissioner and entry held for cancellation.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 1—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Reeves, C. H.	D. L. E. (Missoula) 456	Lolo	40 acres, timber unreported.	Canceled by commissioner.
Rizzonelli, Basil, et al	M. A. (Coeur d'Alene) 03230, M. S. 2524 (Dora lode).	St. Joe	20.250 acres, timber unreported.	Adverse proceedings directed.
Roberts, Sarah F	D. L. E. (Miles City) 098	Custer	160 acres, no timber	Canceled by commissioner on account default of claimant.
Robillard, Joseph A	H. E. (Coeur d'Alene) 5008	Coeur d'Alene	40 acres, 800,000 feet timber	Decision R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Robinson, Benjamin L	T. & S. (Duluth) 08263	Superior	165.45 acres, timber unreported.	Claimant appealed from decision commissioner.
Ross, David D	H. E. (Kalispell) 1936	Flathead	120 acres, 875,000 feet timber.	Decision commissioner favorable to United State affirming decision R. and R.
Ruby Gulch Mining Co	M. A. (Glasgow) 0287 (Yellow Jack, Blue Bell, Aurora Quartz and Excelsior lodes).	Jefferson	80.510 acres, 240,000 feet timber.	Canceled by commissioner as to Blue Bell lode.
Safely, Ida L	D. L. E. (Bozeman) 1298	Gallatin	160 acres, timber unreported.	Patented.
Schedin, Alfred E	H. E. (Coeur d'Alene) 01934.	St. Joe	160 acres, 1,500,000 feet timber.	Adverse report forwarded to chief of field division.
Schlemelin, Louie	T. & S. (Coeur d'Alene) 02469	Pend Oreille	160 acres, timber unreported.	Decision R. and R. favorable to United States.
Schmitz, Winifred S	H. E. (Missoula) 01210	Lolo	160 acres, 900,000 feet timber.	Adverse proceedings directed; hearing held.
School indemnity selections	State of Idaho (Coeur d'Alene).	Coeur d'Alene	13,309.62 acres, timber unreported.	Referred by chief of field division to commissioner.
Scott, Ada P	H. E. (Coeur d'Alene) 0869	do	160 acres, 2,000,000 feet timber.	New investigation ordered closed; no further evidence.
Seat, Adam L	H. E. (Coeur d'Alene) 02525	St. Joe	160 acres, 5,000,000 feet timber.	Decision R. and R. recommended dismissal of proceedings.
Serret, Helen	D. L. E. (Helena) 8358	Absaroka	160 acres, 1,350,000 feet timber.	Decision commissioner holding entry for cancellation affirmed by Secretary.
Shannon, Thomas (assignee of Edward Peterson).	D. L. E. (Great Falls) 3777	Jefferson	160 acres, timber unreported.	Entry canceled by commissioner.
Shapard, Harry	M. A. (Missoula) 01227 (Nisba, Center, Bluebird, and Melrose lodes and Nesba mill site).	Lolo	73.863 acres, 950,000 feet timber.	Reinvestigation by chief of field division ordered by commissioner.
Sharper, Charles B	D. L. E. (Lewiston) 1534	Jefferson	40 acres, timber unreported	Entry canceled by commissioner on account of default of claimant.
Shaw, H. R., et al	Mineral location (Mascot Syndicate placer).	Coeur d'Alene	160 acres, 500,000 feet timber.	Answer filed.
Shennan, Isabella, deceased (G. G. Bennett, lessee).	H. E. (Great Falls) 411	Jefferson	200 acres, 50,000 feet timber	Canceled by commissioner.
Sherman, Frank E	H. E. (Missoula) 01208	Lolo	160 acres, 750,000 feet timber.	Order of cancellation revoked and chief of field division called on for report.
Shoffit, Mary E	H. E. (Spokane) 02917	Kaniksu	160 acres, timber unreported.	Canceled by commissioner.

Sinclair, H	M. E. (Coeur d'Alene) 0408 (Comet placer).	Pend Oreille	do	Answer filed.
Sipola, Antti	H. E. (Duluth) 01432	Superior	108 acres, 150,000 feet timber.	Canceled by commissioner.
Smerke, Gabriel	H. E. (Bozeman) 02923	Gallatin	160 acres, timber unreported.	Motion to dismiss appeal, filed by Solicitor, Department of Agriculture.
Smith, Alvis R	H. E. (Coeur d'Alene) 0162	Coeur d'Alene	160 acres, 1,000,000 feet timber.	Adverse report forwarded to chief of field division.
Smith, John G	H. E. (Missoula) 2516	Lolo	80 acres, timber unreported	Canceled by Commissioner General Land Office.
Solberg, Charles	M. A. (Coeur d'Alene) 02550 (High Ore lode).	St. Joe	18 acres, timber unreported	Relinquished.
Somers, Birdie	H. E. (Missoula) 01429	Missoula	160 acres, 1,000,000 feet timber.	Returned to district forester for reinvestigation.
Stark, Walter A	H. E. (Spokane) 17717	Kaniksu	160, acres, 3,000,000 feet timber.	Approved for patent by commissioner.
Stoll, Joseph	H. E. (Duluth) 21355	Superior	160 acres, timber unreported.	Canceled by commissioner.
Do	H. E. (Missoula) 0863	Lolo	160 acres, 70,800 feet timber.	Hearing held.
Stump, S. J	H. E. (Coeur d'Alene) 05611	Coeur d'Alene	160 acres, 2,000,000 feet timber.	Adverse proceedings dismissed and final certificate authorized by commissioner.
Sullivan, Mathew W	H. E. (Missoula) 2963	Bitterroot	80 acres, 400,000 feet timber.	Proof and supplemental affidavit rejected by commissioner and entry held for cancellation. Appeal filed.
Tash, Noah R	D. L. E. (Helena) 02218	Missoula	160 acres, timber unreported.	Canceled by commissioner.
Taylor, Elizabeth Griffin	H. E. (Coeur d'Alene) 03024	St. Joe	160 acres, 3,500,000 feet timber.	Answer filed by claimant.
Taylor, Hugh P	H. E. (Coeur d'Alene) 0342	do	160 acres, timber unreported.	Adverse report forwarded to chief of field division.
Theisen, Nicholas	H. A. (Coeur d'Alene) 07654	Coeur d'Alene	160 acres, 3,000,000 feet timber.	Do.
Thompson, Thomas L	D. L. E. (Missoula) 828	Bitterroot	160 acres, timber unreported.	Decision R. and R. favorable to United States.
Three H. Placer Co	Mineral locations (Helena and Bozeman) (Three H. placers).	Madison	2,560 acres, timber unreported.	Proceedings dismissed by commissioner.
Toftey, Helge	H. E. (Duluth) 04821	Superior	160 acres, 450,000 feet timber.	Canceled by commissioner.
Tozier, Claude A	H. E. (Missoula) 2608, F. C. 1405.	Lolo	160 acres, 400,000 feet timber.	Do.
Trask, Jane Pierrie	D. L. E. (Lewiston) 610	Jefferson	160 acres, no timber	Adverse proceedings directed by commissioner on amended charges.
Tway, David R	H. E. (Kalispell) 1942	Flathead	160 acres, 1,120,000 feet timber.	Decision R. and R. favorable to claimant affirmed by commissioner and proceedings dismissed.
Van Buren, D. C	Mineral location (Lewiston) (Electric placers Nos. 1, 2, 3, 4).	Nezperce	660 acres, 1,505,000 feet timber.	Decision commissioner holding all locations invalid except NW. ¼ SW. ¼ NE. ¼, sec. 30, tp. 30 N., R. 4 E.
Vient, John	H. E. (Lewiston) 02622	St. Joe	160 acres, 3,500,000 feet timber.	Adverse proceedings directed by commissioner.
Wagoner, David	H. E. (Missoula) 2863	Bitterroot	160 acres, 1,000,000 feet timber.	Entry canceled by commissioner.
Walaber, Andrew	H. E. (Great Falls) 4540	Jefferson	160 acres, timber unreported.	Appeal found defective; pending further report by R. and R.
Walker, Frank	H. A. (Coeur d'Alene) 07476	Coeur d'Alene	160 acres, 3,500,000 feet timber.	Adverse report forwarded to chief of field division.
Wall, Mary	H. E. (Coeur d'Alene) 01175	do	160 acres, 2,500,000 feet timber.	Answer filed.
Washburn, George R	H. E. (Spokane) 17866	Kaniksu	160 acres, 1,500,000 feet timber.	Decision of commissioner holding entry for cancellation affirmed by Secretary.
Watkins, Elsie	H. E. (Lewiston) 02805	St. Joe	160 acres, timber unreported.	Decision R. and R. favorable to claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 1—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
Webster, M. R. (assignee of Claude R. Moss).	D. L. E. (Missoula) 443	Missoula	320 acres, 8,000 feet timber	Charges amended.
West, Ed	Squatter (Kalispell)	Flathead	160 acres, 1,800,000 feet timber.	Entry held invalid by commissioner.
Westfall, Otto	H. E. (Missoula) 0473	Lolo	160 acres, 1,250,000 feet timber.	Hearing held.
Weston, Warren	H. E. (Coeur d'Alene) 02528	St. Joe	160 acres, 4,000,000 feet timber.	Proof rejected and entry held intact.
Williams, Samuel (deceased) (Lee Setser, admin.).	Squatter claim (Coeur d'Alene).	do	160 acres, 900,000 feet timber.	Held pending private suit in State court.
Wilson, William Henry	H. E. (Coeur d'Alene) 02512	do	120 acres, 3,000,000 feet timber.	Decision R. and R. favorable to United States affirmed by commissioner and entry held for cancellation.
Wright, Frank F	M. A. (Coeur d'Alene) 07999 M. S. 2594 (Wooden Lime placer).	Pend Oreille	17 acres, 100,000 feet timber	Adverse proceedings directed by commissioner.
Wood, L. E	M. A. (Missoula) 188 (Last Chance placer).	Missoula	20 acres, no timber	Hearing held.
Woodside, David	D. L. E. (Helena) 01403	Beaverhead	160 acres, 3,250 feet timber	Decision R. and R. favorable to United States.
Woolsey, William, jr	D. L. E. (Bozeman) 1397	Absaroka	40 acres, timber unreported	Adverse proceedings directed by commissioner.
Wynne, Dixie	H. E. (Lewiston) 01938	St. Joe	39.55 acres 200,000 feet timber.	Canceled by commissioner.
Yates, Charles M	L. S. (Missoula) 4353	Missoula	160 acres, timber unreported.	Adverse proceedings directed on substituted charges.
Young, W. H	Mineral location (Helena) (Corea placer, Security lode and Security mill site).	Madison	100 acres, 116,500 feet timber.	Judgment by default against Security lode and Security mill site.
Zorn, Horace L	H. E. (Coeur d'Alene) 02488	St. Joe	160 acres, 4,000,000 feet timber.	Adverse report forwarded to chief of field division.

DISTRICT NO. 2.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Aldrich, L. W., et al	M. E	Pike		Canceled on relinquishment.
Astle, G	M. E	Leadville	320	Canceled on default.
Baca, Luis	H. E	San Isabel	160	Decision of commissioner for claimant.
Bailey, Robert M	H. E	Routt	160	Canceled on default.

Bellemore, Thomas	M. E	Harney	268.67	Proceedings dismissed by commissioner upon request of Forest Service.
Bisch, Raymond	H. E	San Isabel	160	Decision of commissioner for claimant with coal reservation.
Bodenner, Wm	M. E	Hayden	20.66	Proceedings dismissed by commissioner upon request of Forest Service.
Bowman, Charles W	H. E	Durango	160	Canceled on default.
Boyer, Charles E	M. E	Pike	12.695	Canceled.
Broughton, Sidney	D. L. E	Holy Cross	80	Proceedings dismissed by commissioner upon favorable report by Forest Service.
Brown, G. B., et al	M. E	Gunnison	46	Canceled on default.
Brown, C. L., & Mattie	M. E	do	40	Do.
Brownlee, Bertha M	H. E	Montezuma	160	Canceled.
Casto, Mathew	H. E	Uncompahgre	160	Canceled on relinquishment.
Chelf, William W	P. C. E	Battlement	160	Not in National Forest.
Clark, Lizzie	D. L. E	Colorado	80	Canceled on default.
Cook, Henry	H. E	Routt	160	Canceled.
Copper Six Mining Co	M. A	Pike	58.468	Canceled on relinquishment.
Davies, James, Jr	H. E	Rio Grande	180	No protest by Forest Service to amended entry.
Demereau, James, & Robbins, C. W	M. E	Harney	30	Proceedings dismissed by commissioner at request of Forest Service.
Erieson, Joseph	H. E	Montezuma	160	Canceled.
Ewell, Henry C	H. E	Arapaho	160	Do.
Friend, Wm	M. E	Gunnison	20.66	Proceedings dismissed by commissioner upon request of Forest Service.
Garcia, Consolaceon	H. E	San Juan	160	Decision of commissioner for claimant.
Gillespie, William E	H. E	Routt	160	Canceled on relinquishment.
Gillis, C. L., et al	M. E	Black Hills	31.18	Canceled in part: patent issued as to remainder.
Gwyn, Edward	H. E	Shoshone	160	Canceled.
Hahn's Peak G. M. & M. Co	M. E	Routt	61.986	Proceedings dismissed by commissioner upon request of Forest Service.
Harbach, Chas	M. E	Harney	40	Do.
Harpending, Lindley	H. E	Gunnison	160	Canceled.
Henault, Denis	H. E	Harney	40	Decision of commissioner for Government.
Hoskinson, Alice	H. E	Nebraska	160	Canceled.
Humphrey, I. M., and Stenger, Ed	M. E	Harney	140	Approved for patent.
Ireland, Isaac	H. E	Black Hills	160	Canceled on default.
King Solomon Tunnel & Development Co.	M. E	Leadville	160	Proceedings dismissed by commissioner upon request of Forest Service.
Do	M. E	do	160	Favorable report submitted to chief of field division with request that proceedings be dismissed.
Knapp Mining Co	M. E	Hayden	82.208	Canceled in part: proceedings dismissed as to remainder.
Knuth, Bertha	T. & S	San Isabel	160	Decision of Secretary of Interior in favor of Government.
Knuth, Helmuth	T. & S	do	160	Do.
Larson, Gus	H. E	Durango	160	Canceled.
Lennox, John C	H. E	San Juan	160	Decision of commissioner in favor of claimant.
Lyree, Henry C	H. E	Montezuma	160	Canceled.
McIntire, A. S	M. E	San Isabel	10.331	Proceedings dismissed by commissioner upon request of Forest Service.
McLain, Albert N	H. E	do	160	Canceled on relinquishment.
McKay, D. J., et al	M. E	Pike	120	Adverse proceedings revoked; favorable report by chief of field division upon reexamination.
Martinez, Alcaria	H. E	San Isabel	160	Canceled on relinquishment.
Maxwell, Charles A	H. E	Colorado	160	Relinquished.
Maxwell, James D	T. & S	do	160	Decision of commissioner in favor of claimant.
Maxwell, Mary A	T. & S	do	160	Do.
Mile High M. & M. Co	M. E	Harney	100	Do.
Miller, Jno. A	M. E	Black Hills		Do.
Montgomery M. & M. Co	M. E	Leadville	13.802	Proceedings dismissed by commissioner upon request of Forest Service.
Morgan, Nora S	D. L. E	Routt	160	Relinquished.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 2—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Montoza, Manuel	H. E.	Rio Grande	160	Canceled.
Morrison, John	M. E.	Pike	7.646	Patent issued.
Murphy, Merritt, & Cook, S. L.	M. E.	Harney	20	Canceled on default.
Myers, Jas. H	M. E.	Leadville	5.165	Protest by Forest Service withdrawn.
Olgrion, Enearcion	H. E.	San Isabel	160	Canceled on default.
Omar Gold M. & T. Co	M. E.	Pike	119.045	Decision of Secretary of Interior in favor of Government.
O'Meara, Sam P	M. E.	Washakie	2,080	Proceedings dismissed by commissioner upon request of Forest Service.
Ostrom, Chas., et al	M. E.	Black Hills	80	Do.
Pittsburg Mining Co	M. E.	Harney	20	Canceled.
Putnam, Hannah	M. E.	Pike	30.697	Protest of Forest Service withdrawn.
Quayl, William A	M. E.	Black Hills	68	Patented.
Rowe, Richard P	H. E.	San Isabel	160	Canceled.
Saginaw Gold Mining Co	M. E.	Harney	390	Decision of commissioner in favor of Government.
Sawyer, John F	M. E.	Black Hills	143.489	Relinquished in part; clear listed in part.
Schill, Pauline P	H. E.	Sundance	160	Decision of commissioner in favor of claimant.
Schneider, J. D	M. E.	Pike	80	Canceled on relinquishment.
Schroeder, C. E	H. E.	Routt	160	Canceled on default.
Shelhamer, Edwin N	H. E.	Durango	80	Decision of commissioner in favor of claimant, subject to further compliance with law.
Shropshire, Clyde E	P. C. E	Battlement	160	Not within National Forest.
Sims, Katie E	H. E.	Sundance	160	Canceled.
Smith, Clara and Clifford P	C. E.	Routt	320	Decision of commissioner in favor of claimants.
Smith, Emma	H. E.	Sundance	160	Decision of Secretary of Interior in favor of Government.
Soule, Jesse	H. E.	White River	80	Relinquished.
Sparks, Forrest H	H. E.	San Juan	160	Canceled.
Sullivan, Nancy C	D. L. E.	Harney	160	Canceled in part; proceedings dismissed as to remainder.
Terrell, Frank	H. E.	Holy Cross	160	Canceled.
Thompson, Clyde M	H. E.	Montezuma	160	Do.
Valdez, Jose	H. E.	Rio Grande	160	Do.
Vigil, Pedro Jose	H. E.	San Isabel	160	Do.
Wabash M. & M. Co	M. E.	Harney	340	Decision of commissioner in favor of Government.
Watson, L. D	H. E.	Colorado	160	Canceled on relinquishment.
Westover, J. H	M. E.	Harney	160	Decision of commissioner in favor of Government.
Wilson, Mary	H. E.	Uncompahgre	160	Relinquished.
Winner, John W	M. E.	Hayden		Protest by Forest Service withdrawn.
Wolfe, Jennie	H. E.	Montezuma	160	Canceled.
Zimmerman, Agnes	H. E.	Colorado	160	Decision of commissioner in favor of claimant.
Zimmerman, Eda	H. E.	do	160	Decision of Secretary of Interior for Government.
Atkins, Benjamin F	H. E.	Sundance	160	Adverse proceedings directed by General Land Office.
Atwell, James W. & Clara	C. C. E.	White River	320	Decision of register and receiver for Government; appealed by claimant.

Bailey, Thomas	H. E	Holy Cross	120	Decision of commissioner for Government; appealed by claimant.
Bainbridge, T. A	M. E	Pike	10.331	Decision of register and receiver in favor of Government.
Barker, Clara	H. E	Durango	160	Adverse proceedings directed by General Land Office; hearing applied for.
Beckman, J. A	C. D. S	Gunnison	160	Decision of register and receiver for claimant.
Belarde, Jose Estevan	H. E	San Isabel	160	Decision of register and receiver in favor of claimant.
Belzora-Bassick Mining Co	M. E	Gunnison	78	Hearing postponed indefinitely at request of claimant.
Do	M. E	do	589	Do.
Do	M. E	do	51	Do.
Do	M. E	do	146	Do.
Bemrose, William	M. E	Leadville	1,997	Decision of commissioner in favor of Government; appealed by claimant.
Black Hills & Denver G. M. Co	M. E	Pike	19.404	Decision of commissioner for Government; appealed by claimant.
Blanchard, Richard	M. E	Gunnison	20	Decision of register and receiver for Government on default.
Do	M. E	do	20.475	Decision of register and receiver in favor of Government.
Breckel, Wm. J	C. C. E	White River	200	Decision of register and receiver for Government.
Bunte, C. Henry	M. E	Pike	60	Decision of commissioner for Government; appealed by claimant.
Brooks, Benjamin L	H. E	Uncompahgre	120	Adverse report submitted to chief of field division.
Burgess, Elmer & Phoebe J	C. C. E	White River	320	Decision of commissioner in favor of Government; appealed by claimants.
Burnham, C. F., et al	M. E	San Isabel	320	Decision of register and receiver for Government on default.
Clough, W. P	M. E	Pike	95.657	Proceedings ordered; action suspended until private contest is adjudicated.
Colorado Gold Dredging Co	M. E	Leadville	752	Adverse report submitted to chief of field division.
Colorado Portland Cement Co	M. E	San Isabel	1,600	Do.
Colorado Smelting & Mining Co	M. E	Gunnison	307	Adverse proceedings directed by General Land Office.
Comerford, John D	H. E	Black Hills	160	Decision of commissioner for Government; entry reinstated and hearing ordered by Secretary of Interior.
Copeland, Aggie E	D. L. E	Sopris	295	Hearing continued indefinitely upon request of claimant.
Copeland, William S	D. L. E	do	288.25	Do.
Crown Syndicate Co	M. E	Pke	119.932	Hearing postponed indefinitely pending reexamination.
Davis, W. J., & Goodrich, W. E	M. E	do	10	Adverse proceedings directed by General Land Office.
Decker, Nathaniel	H. E	Montezuma	80	Adverse report submitted to chief of field division.
Dewing, Wm. S	M. E	Harney	130.118	Hearing held.
Do	M. E	do	43.055	Adverse report submitted to chief of field division.
Dooley, Thomas (Wm. J. Lusher, transferee).	H. E	Leadville	79.95	Hearing held.
Douglas Gold & Copper Co	M. E	Medicine Bow	103.116	Decision of register and receiver for Government.
Dunning, Frank E	H. E	Montezuma	160	Adverse report submitted to chief of field division.
Dunton Consolidated Mining Co	M. E	do	75.3	Decision of Secretary of Interior for Government; motion for rehearing denied with instructions that further proof be submitted by claimant.
Eckbert, W. H., & Pearson, A. L	M. E	Gunnison	30	Decision of register and receiver for Government; appealed by claimants.
Evans, Wm. M	H. E	Arapaho	160	Adverse proceedings directed by General Land Office; hearing applied for.
Fowler, George H	H. E	San Isabel	160	Adverse report submitted to chief of field division.
Fowler, William H	H. E	do	160	Do.
Francis, Mary J	D. L. E	Sopris	160	Hearing held.
Gantz, Jacob S	M. E	Black Hills	40	Decision of register and receiver for claimant.
Gagner, Charles	C. D. S	Gunnison	160	Do.
Hall, H. J., et al	M. E	San Isabel	134.303	Adverse proceedings directed by General Land Office.
Hamilton, Flora A. (widow of D. B. Young).	H. E	Montezuma	160	Do.
Harney Peak T. M. M. & M. Co	M. E	Harney	145.11	Awaiting hearing.
Hercules Gold Mining Co	M. E	Black Hills	75.278	Adverse proceedings directed by General Land Office.
Hicks, Robert E	H. E	Arapaho	160	Decision of register and receiver for Government.
Howell, John	H. E	Montezuma	160	Decision of register and receiver for claimant.
Independent Gold Mining Co	M. E	Gunnison	68.253	Decision of register and receiver for Government.
Interstate Gold Mining & Milling Co	M. E	Harney	147	Decision of commissioner for Government; appealed by claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 2—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1812.
			Acres.	
Jermillo, Jose Ma	H. E	Rio Grande	160	Decision of register and receiver for claimant.
Jupiter Mining Co	M. E	Medicine Bow	82.644	Decision of commissioner in favor of Government, subject to right of appeal.
Kearns, George T	M. E	Pike	148.83	Decision of register and receiver for Government; appealed by claimant.
Kentucky Gulch Mining Co	M. E	Gunnison	61.206	Adverse proceedings directed by General Land Office.
Kirk, Frank L. and Elisha S	M. E	Harney	140	Hearing indefinitely continued.
Latta, James	M. E	Gunnison	3.792	Decision of register and receiver for Government on default.
Lewis, Rosa A	H. E	Sundance	80	Adverse proceedings directed by General Land Office; hearing applied for.
Lincoln M. M. & T. Co	M. E	Pike	27.948	Hearing held.
Linney, J. F	C. D. S	Gunnison	160	Decision of register and receiver for claimant.
Lujan (now Lusero), Fede	H. E	Rio Grande	160	Adverse proceedings directed by General Land Office.
McBride, A. C	H. E	Black Hills	160	Decision of commissioner for claimant; appealed by Department of Agriculture.
McKnight, Elijah C	P. D. S	Uncompahgre		Decision of register and receiver for Government.
McNeal (now Brunel), Faye A	T. & S	San Juan	160	Hearing held.
MacWatters, D. C	C. D. S	Gunnison	160	Decision of register and receiver for claimant.
Maez, Sarah	H. E	San Juan	160	Adverse report submitted to chief of field division.
Matt, Katrina	M. E	Harney	108.27	Decision of commissioner in favor of Government, subject to right of appeal by claimant.
Miller, C. J., et al	M. E	Pike	45.96	Hearing held.
Moore, Guy	H. E	San Isabel	160	Adverse proceedings directed by General Land Office.
Mount Wilson M. and T. Co	M. E	Pike	10	Do.
Peterson, Eunice A	H. E	Uncompahgre	160	Held for cancellation.
Rice, Emma F	M. E	Pike	40.976	Awaiting hearing.
Robinson, R. C	M. E	Black Hills	216.19	Adverse proceedings directed by General Land Office.
Robinson, Samuel and Joseph	M. E	Pike	30.993	Dismissal of proceedings recommended by Forest Service; further investigation directed by General Land Office.
Ryan, Wm. F	C. D. S	Gunnison	160	Decision of register and receiver for claimant.
Seeman, Henry I	M. E	Pike	159.956	Adverse proceedings directed by General Land Office.
Shoecraft, Wm. H	C. D. S	Gunnison	160	Decision of register and receiver for claimant.
Simonton, George E	C. D. S	do	160	Do.
Sparks, Edna E	H. E	San Juan	160	Held for cancellation.
Sparks, Harry L	H. E	do	160	Do.
Trujillo, Juan	H. E	Rio Grande	160	Adverse report submitted to chief of field division.
United Copper Mines Co	M. E	Sopris	175	Do.
Vance, John, et al	M. E	Harney	82.644	Decision of commissioner in favor of Government; appealed by claimants.
Victoria Mining Co	M. E	Medicine Bow	64	Decision of commissioner in favor of Government; appealed by claimant.
Wales, Martha E	H. E	Montezuma	160	Hearing ordered.
Warkins, Eleanore M	H. E	Routt	160	Hearing held.
Webster, D. W	M. E	Black Hills	183.216	Adverse proceedings directed by General Land Office.

Westinghouse Electric and Manufacturing Co.	M. E.	Harney	240	Decision of commissioner in favor of claimant; appealed by Department of Agriculture.
Whitcher, Roy	H. E.	Sundance	160	Hearing held.
Wright, Samuel J	P. C. E.	Uncompahgre	160	Decision of register and receiver in favor of Government on default.

DISTRICT NO. 3.

			Acres.	
Abbott, Wm. T	H. E.	Arkansas	160	Proceedings dismissed.
Adams, Marion M	H. E.	do	160	Canceled.
Adkinson, Peggy J. H	H. E.	Florida	160	Final certificate issued.
Allen, Fred E	H. E.	Arkansas	160	Proceedings dismissed.
America et al. mill sites	M. A.	Crook	10	Adverse proceedings directed.
Anderson, Henry C	H. E.	Ozark	160	Canceled.
Apple, Lina C	H. E.	Arkansas	160	Do.
Ayers, Mrs. J. D	H. E.	Gila	160	Final certificate issued.
Bailey, Washington	H. E.	Florida	160	Canceled.
Ballard, Wm. H	T. & S.	Arkansas	160	Decision of local land office in favor of claimant; **pending.**
Barbaro, Miguel	H. E.	Pecos	160	Canceled on relinquishment.
Barnard, W. E	H. E.	Arkansas	160	Proceedings dismissed.
Beals, W. O	H. E.	do	160	Canceled.
Berta, Pietro	H. E.	do	160	Do.
Bishop, J. F. M	H. E.	Florida	160	Proceedings dismissed.
Bismark lode	M. Loc.	Wichita	20	Location declared invalid.
Blanchard, P. H	H. E.	Lincoln	160	Favorable report to General Land Office.
Bohannan, J. J	H. E.	Ozark	160	Canceled.
Boirn, Saber S	H. E.	Arkansas	80	Favorable report to General Land Office.
Boling, A. W	H. E.	do	160	Canceled.
Booker, S. H	H. E.	do	160	Adverse proceedings dismissed.
Brewer, Jas. A	H. E.	Florida	160	Decision of local land office in favor of Government; **pending.**
Brooks, Geo. B	H. E.	do	160	Proceedings dismissed.
Brooks, John W	H. E.	do	160	Canceled.
Brown, Elizabeth, widow of J. G. Brown	H. E.	do	160	Decision of local land office in favor of claimant; pending.
Brown, Jas. M	H. E.	Ozark	160	Canceled.
Bruner, W. D	H. E.	Florida	160	General Land Office declined to direct adverse proceedings.
Bryan, John	H. E.	Arkansas	80	Hearing set.
Bunch, John W	H. E.	Ozark	160	Proceedings dismissed.
Burgess, Jas. S	H. E.	do	160	Held for cancellation; pending on appeal to Secretary.
Burrus, John E	H. E.	Arkansas	160	Compliance with law sufficient.
Byers, Wm. G	T. & S.	do	160	Canceled.
Cagle, Wm. P	H. E.	Ozark	160	Decision local land office in favor of claimant; pending.
Cain, J. W	H. E.	Arkansas	160	Held for cancellation; pending on appeal to Secretary.
Candelaria, Serafin	H. E.	Manzano	160	Favorable report.
Carlton, M. E	H. E.	Ozark	160	Canceled.
Carter, Chas	H. E.	Arkansas	160	Do.
Carter, R. O	H. E.	do	120	Held for cancellation; entry erroneously allowed.
Caughman, F. R	H. E.	do	160	Canceled.
Chasteen, J. H	H. E.	Ozark	160	Do.
Chestnut, Lewis E	H. E.	Florida	160	Final certificate issued.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 3—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Clark, Anson	H. E.	Ozark	160	Held for cancellation; expiration of statutory period.
Clarke, C. W	L. S.	Chiricahua	160	Charges denied; date for hearing not yet set.
Clayborn, J. T	H. E.	Ozark	160	Lands eliminated.
Clayton, A. J	H. E.	Arkansas	160	Adverse proceedings directed.
Cleveland placer	M. E.	Pecos	160	Patent issued.
Cochise White Marble placer	M. A.	Chiricahua	144	Charges dismissed.
Cogburn, R. J	H. E.	Arkansas	80	Patented.
Coleman, J. R	H. E.	Apache	80	Adverse report pending.
Columbus lode	M. L.	Wichita	20	Hearing continued; pending further investigation.
Consolidated Big Spring et al. placers	M. A.	Ozark	1,297.40	Declared null and void.
Consolidated No. 2 placer	M. A.	do	360	Hearing continued; pending further investigation.
Consolidated No. 5 placer	M. A.	do	313.5	Declared invalid.
Conway, Jos. H	T. & S.	Arkansas	160	Decision local land office in favor of claimant; pending.
Copper Queen lode	M. A.	Gila	20	Favorable report submitted to General Land Office.
Cornelius, Martha	H. E.	Arkansas	160	Adverse proceedings dismissed.
Cottonwood lode	M. E.	Prescott	20	Canceled.
Counts, Clarence	T. & S.	Arkansas	160	Do.
Counts, S. P	T. & S.	do	160	Decision local land office in favor of claimant; pending.
Crabtree, Robt	H. E.	Manzano	160	Canceled.
Cumbie, W. H	H. E.	Arkansas	160	Do.
Curtis, B. L	H. E.	do	160	Do.
Curtis, J. B	H. E.	Alamo	160	Do.
Dadeville et al. lodes	M. A.	Crook	10	Application rejected.
Davis, J. W	H. E.	Ozark	160	Patented.
Dearray, John	H. E.	Arkansas	160	Canceled.
Decker, L. A	D. L. E.	Sitgreaves	160	Decision local land office in favor of United States; pending.
Della, Peter A	H. E.	Arkansas	120	F. C. canceled and entry intact.
Denton, Thos. W	H. E.	do	160	Decision of Secretary rejecting proof holding entry intact.
Dickson, Dora L	H. E.	do	160	Adverse report pending.
Diedrich, Peter	H. E.	do	160	Decision local land office in favor of United States; pending.
Dodson, R. S	H. E.	do	160	Canceled.
Duncan, Wm	H. E.	do	160	Held for cancellation; pending on appeal to Secretary.
Dunkin, Van	H. E.	do	160	Held for cancellation.
Duran, Juan	S. H.	Jemez	80	Canceled by default.
Edwards, A. J	H. E.	Arkansas	160	Held for cancellation.
Emberson, M. E	H. E.	do	160	Canceled.
English, Geo. N	H. E.	Ozark	160	Do.
Epperson, Jos. T	H. E.	Arkansas	160	Adverse report pending.
Eslinger, A. T	H. E.	do	160	Proceedings dismissed.
Essman, Jas. A	H. E.	do	160	Canceled.

Essman, Wm. M	H. E	....do	160	Patented.
Farrar, J. E	A. F. E	....do	80	Canceled.
Fish, M. J. B	H. E	Ozark	160	Relinquished.
Ford, A. L	H. E	Arkansas	160	Held for cancellation; pending on appeal to Secretary.
Ford, W. A	H. E	....do	160	Do.
Forehand, H. W	H. E	....do	160	Canceled; pending on claimant's appeal to Secretary filed out of time.
Forest, Dew T	H. E	....do	40	Proceedings dismissed.
Fox, Elijah	H. E	....do	160	Adverse report pending.
Foy, Thos	H. E	Gila	160	Report transmitted to General Land Office with recommendation that claimant be allowed to amend.
Frazier, Sarah	H. E	Florida	160	Proceedings dismissed; pending on appeal to Secretary.
French, F. M	Squatter	Alamo	160	Entry held for cancellation because land unsurveyed; adverse report on squatter claim pending.
Frisco et al. lodes	M. L	Prescott	80	Declared invalid.
Fritz, S. H	H. E	Arkansas	160	Proceedings dismissed.
Gale, J. M	T. & S	....do	160	New notice of proceedings directed.
Galena lode	M. E	Wichita	20	Hearing set.
Gallegos, Jose	H. E	Zuni	160	Report pending for further investigation.
Ganey, J. A	H. E	Florida	160	Canceled on relinquishment.
Gardner, Frank	H. E	Ozark	160	Do.
Garrison, Carlotta E. (formerly Hopkins).	H. E	....do	160	Proof rejected; entry held for cancellation.
Gibson, M. E	H. E	....do	160	Canceled.
Gilliland, G. E	H. E	Alamo	160	Do.
Gonzales, Emilio Y	S. H	Jemez	160	Do.
Gonzales, M. A	S. H	Jemez	160	Adverse report pending; chief of field division directed to make further report.
Gonzales, Prudencio	H. E	Pecos	160	Held for cancellation.
Gonzales, Reyes	S. H	Jemez	128.77	Canceled.
Good Luck lode	M. L	Chiricahua	20	Declared invalid.
Goodwin, Wm. T	H. E	Arkansas	160	No objection to issuance of patent.
Goosby, Dave	H. E	Florida	160	Adverse report pending.
Graham, Geo. W	T. & S	Arkansas	160	Decision of local land office in favor of claimant; pending.
Graves, Wm	H. E	....do	80	Patented.
Griggs, S. P	A. H. E	Ozark	160	Eliminated.
Gunn, Wm. J. (heir of E. G. Gunn)	H. E	Florida	160	Canceled.
Gunn, Wm. J., sr	H. E	....do	160	No protest to patent.
Gurule, Jose L. A	S. H	Manzano	160	Do.
Hambrick, Wiley	H. E	Florida	160	Proceedings dismissed.
Hancock et al. lodes	M. E	Prescott	131	Hearing set.
Hansard, J. L	H. E	Arkansas	160	Approved for patent.
Hare, Wm. A	A. F. H. E	Ozark	120	Decision local land office in favor of claimant; pending.
Harris, Wm. J	H. E	....do	160	Canceled.
Harrell, Chas. H	H. E	Arkansas	160	Held for cancellation; pending on appeal to Secretary.
Harris, Carrie	H. E	Florida	160	Application for reinstatement denied.
Hart, Anthony	H. E	Ozark	160	Canceled.
Hasson, N. F	H. E	Zuni	160	Do.
Harold et al. lodes	M. A	Prescott	33	Held invalid.
Helen Gould et al. lodes	M. A	Coronado	60	Do.
Hill, Jos. P	H. E	Arkansas	160	Proceedings dismissed.
Hill, Thos. J	H. E	....do	160	Proceedings dismissed; entryman required to readvertise.
Hillside lode	M. A	Tusayan	20	Closed on favorable report of mineral surveyor.
Hinton, Chas. H	H. E	Wichita	80	Local land office decision in favor of claimant; pending.
Hise, J. M	H. E	Arkansas	160	Proceedings dismissed.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 3—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Hobson placer	M. A	Prescott	20	Declared null and void.
Holladay, J. A	H. E	Sitgreaves	85	Adverse proceedings directed.
Holmes, Rosa	H. E	Ozark	80	Proof rejected; entry held intact.
Howard, H. C	H. E	Arkansas	160	Held for cancellation; pending on appeal to Secretary.
Hudgins, Jos. R	H. E	do	160	Proceedings dismissed.
Hughes, Mary	H. E	Ozark	160	Proof rejected; entry held for cancellation; expiration of statutory period.
Hughes, J. A	H. E	Arkansas	160	Canceled.
Hughes, Michael	H. E	Datil	160	Eliminated.
Hunter, H. E	H. E	Arkansas	160	Proceedings dismissed.
Hutson, G. F	H. E	do	160	Do.
Hyde, F. A., & Co	L. S	Coronado	40	Charges denied; hearing not yet set.
Irwin, T. R	H. E	Apache	160	Canceled.
Ivy lode	M. L	Lincoln	20	Annulled.
Jackson, A. M	H. E	Arkansas	160	Proceedings dismissed.
Jackson, Jas. E	H. E	do	160	Do.
Jeffry, Robt. W	H. E	do	160	Hearing set.
Jesuit lode	M. E	Coronado	12	Land eliminated.
Johnson, J. B	H. E	Arkansas	160	Adverse report pending.
Johnson, T. A	H. E	do	160	Held for cancellation; pending on appeal to Secretary.
Jones, A. D	H. E	do	160	Local land office decision in favor of United States; pending.
Jones, Geo. H	H. E	do	160	Adverse proceedings directed.
Jones, T. W	H. E	do	160	Canceled.
Jones, Wm. M	H. E	do	160	Local land office decision in favor of claimant; pending.
Justerson, M. C	H. E	do	160	Canceled.
Kanuck et al. lodes	M. A	Prescott	83	Hearing set.
Kemp, J. G	H. E	Ozark	160	Canceled.
Kenna, Clayton F	H. E	Arkansas	160	Held for cancellation.
Kowalaski, A. T	H. E	Ozark	160	Canceled.
Lair, J. N	H. E	Arkansas	160	Do.
Latham, C. L	H. E	Alamo	160	Held for cancellation.
Leach, J. W	H. E	Arkansas	160	Canceled.
Leseuer, Wm. C	H. E	Apache	160	Decision of local land office in favor of claimant; pending.
Lewis lode	M. A	Lincoln	20	Held invalid.
Lindsey, C. L	H. E	Arkansas	160	Proceedings dismissed.
Linley, Jas	H. E	do	160	Canceled.
Livingston, W. G	H. E	Ozark	160	Do.
Logan et al. lodes	M. A	Prescott	206	Decision of local land office in favor of United States.
London, Wm. R	T. & S	Arkansas	160	Decision of local land office in favor of claimant; pending.
Luber, John	H. E	Ozark	160	Held for cancellation; pending on appeal to Secretary.
Lujan, Simon	H. E	Pecos	160	Patented.

Lute, Peter	H. E	Arkansas	160	Eliminated.
McCallum, Elizabeth	H. E	Ozark	80	Patented.
McCormick, J. E	H. E	Arkansas	160	Final certificate authorized.
McDaniel, J. D	H. E	do	160	Canceled.
McKee, Wm. G	H. E	Ozark	160	Patented.
McKenzie, D. P	H. E	Florida	160	Canceled.
McKinley mill-site No. 2	M. L	Gila	5	Proceedings dismissed.
McLaughlin, Geo. R	H. E	Florida	160	Report pending.
McNeill, John A	H. E	do	160	Canceled.
Mack, John	H. E	Arkansas	160	Patented.
Major, H. F	H. E	do	160	Proceedings dismissed.
Malcolm, Margaret	H. E	Lincoln	160	Canceled.
Manzanares, Romalda	S. H	Jemez	160	Small holding finally rejected, result of contest.
Martin, J. J	H. E	Ozark	160	Canceled.
Martinez, J. M., heirs of	H. E	Pecos	160	Do.
Marxmann, Sarah (widow of Fred Marxmann).	H. E	Ozark	80	Adverse report pending.
Mathey, Jos	H. E	Arkansas	120	Hearing held; decision of local land office not rendered.
Midget placer	M. A	Prescott	20	Outside forest.
Monarch lode	M. L	Lincoln	20	Location annulled.
Mondragon, Trinidad	H. E	Carson	160	No objection to patent.
Mondragon, Wm. T	H. E	Ozark	160	Canceled by relinquishment.
Monroe Doctrine et al	M. A	Crook	41	Canceled.
Moore, Mark	H. E	Arkansas	160	Local land office decision in favor of claimant; pending.
Murphy, Wm	H. E	do	160	Canceled.
Myers, Ollie	H. E	Ozark	160	Adverse report pending.
Nevitt, B. M., heirs of	H. E	Arkansas	160	Local land office decision in favor of claimant; pending.
Nichols, I. W	H. E	do	160	Canceled.
Nix, Wm. O	H. E	do	160	Do.
Nopper, Bertha	H. E	do	160	Do.
Oakland et al. lodes	M. A	Crook	38	Adverse proceedings directed.
Ortiz, Casimino	H. E	Pecos	160	Commissioner's decision in favor of claimant; pending on appeal to Secretary.
Otero, F	H. E	Manzano	39	Pending survey of conflicting small holding claims.
Owens, Rebecca B	H. E	Arkansas	160	Adverse report pending.
Owens, W. J	H. E	do	80	Outside forest.
Parker, J. M	H. E	Florida	160	Canceled.
Parsons, John F	H. E	Ozark	160	Do.
Peoria extension No. 1 placer	M. E	Prescott	20	Hearing set.
Pettit, S. J	H. E	Arkansas	160	Canceled.
Pilkenton, L. C	H. E	do	160	Proceedings dismissed.
Poston, Geo	H. E	do	160	Held for cancellation; pending on appeal to Secretary.
Powers, A. J	H. E	do	160	Canceled.
Ragsdale, Wm. M	H. E	Ozark	80	Do.
Rapier, Wm. M	H. E	Alamo	180	Adverse report pending.
Reed, J. A	H. E	Arkansas	160	Canceled.
Roope, L. A	H. E	do	160	Proceedings dismissed.
Rowland, Mary C	H. E	do	160	Held for cancellation.
Roybal, Lucrecio	H. E	Pecos	160	Canceled.
Saffell, C. G	H. E	Apache	160	Entry amended.
Sandoval, Pedro	H. E	Manzano	160	Canceled.
Sanford, W. H	H. E	Arkansas	160	Held for cancellation; pending on appeal to Secretary.
Santmyers, A. F	H. E	do	160	Do.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 3—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Sellars, Deek H	H. E	Arkansas	160	Canceled.
Shaddon, J. T	H. E	do	160	Held for cancellation; pending on appeal to Secretary.
Sheffield, O. R	H. E	do	160	Canceled.
Shelby, Lewis	H. E	do	160	Relinquished.
Shelley, Janie	H. E	Florida	120	F. C. authorized.
Shelley, Jos. A	H. E	do	160	Canceled.
Shore, Wm. A	H. E	Arkansas	160	Adverse report pending.
Sims, Isaac	H. E	do	160	Canceled.
Singleton, W. C	H. E	do	160	Do.
Smail, J. E	H. E	do	160	Application for reinstatement finally rejected.
Smith, Jas. J	H. E	do	80	Canceled.
Snow, Rebecca	H. E	Ozark	80	Do.
Speights, Mahala	H. E	Arkansas	160	Annulment of patent proceedings abandoned.
Spiva, Jonas L	H. E	do	160	Canceled.
Stanley et al., lodes	M. A	Prescott	60	No objection to patent.
Stephens, A	H. E	Ozark	160	Canceled.
Stewart, J. H	H. E	do	160	Do.
Stewart, Jas. L	H. E	Arkansas	160	Proceedings dismissed.
Stormes, Jas. B	H. E	do	160	Do.
Strain, Jos. H	H. E	Ozark	160	Local land office decision inf avor of United States; pending.
Strayhorn, T. B	H. E	Arkansas	160	Do.
Stuckey, Jas. M	H. E	Florida	160	No objection to patent.
Sturgeon, J. A	H. E	Arkansas	160	Canceled.
Sunnyside et al., lodes	M. A	Crook	109	Adverse proceedings directed.
Swiney, Robt. D	H. E	Florida	160	Local land office decision in favor of United States; pending.
Tate, Robt. H	H. E	Ozark	160	Held for cancellation.
Taylor, Elizabeth	H. E	do	160	Decision of local land office in favor of claimant; pending.
Tennessee lode	M. E	Wichita	20	Declared invalid.
Thompson, T. E	H. E	Ozark	160	Canceled.
Tillery, Jennie	H. E	Arkansas	160	Do.
Todt, John	H. E	do	160	Decision of local land office in favor of United States.
Trainor, H. P	H. E	Apache	160	Canceled.
Trujillo, Pilar	H. E	Manzano	160	Favorable recommendation.
Trujillo, Ramon	H. E	Carson	40	Report pending.
Turkey lode	M. L	Prescott	20	Proceedings dismissed.
Tuttle, C. W	H. E	Ozark	160	80 acres canceled; F. C. on 80 acres.
Vance, Wm. H	H. E	Arkansas	160	Adverse proceedings directed.
Vasquez, Francisco	Squatter	Pecos	160	Do.
Verbridge, Jacob	H. E	Ozark	160	Canceled.
Wamego lode		Gila	20	No case pending.

Ware, H. J	H. E	Arkansas	160	Canceled; hearing ordered on application for reinstatement.
Warren, Oliver	H. E	Ozark	160	Hearing held; additional testimony to be taken.
Waterman, L. P	H. E	Florida	160	Canceled.
Waters, Frank	H. E	do	160	Do.
Watkins, S. T., heirs of	H. E	Chiricahua	160	Decision of local land office in favor of United States; pending.
Watson, Wm. H	H. E	Arkansas	160	Held for cancellation; pending on appeal to Secretary.
Webb, E. H	T. & S	do	160	Local land office decision in favor of United States; pending.
Weekly, C. L	H. E	Florida	160	Do.
Weekly, Frances F	H. E	do	160	No objection to patent.
Weekly, Mary E	H. E	do	160	Proceedings dismissed.
Weekly, Mattie V	H. E	do	160	No objection to patent.
Weekly, Wm. E	H. E	do	160	Local land office decision in favor of United States; pending.
Weiser, S. J	H. E	Ozark	160	Entryman given option of paying commutation price or defending entry against charge of nonresidence.
Westlund, F. T	T. & S	Arkansas	160	Decision of local land office in favor of claimant; pending.
Whisenhunt, W. T., jr	H. E	do	80	Hearing set.
Whitcamp, T. H	T. & S	do	80	Patented.
Whitener, F. L	T. & S	do	160	Relinquished.
Whitener, G. V	T. & S	do	160	Decision of local land office in favor of claimant; pending.
Whitener, H. S	T. & S	do	160	Do.
Whitener, J. L	T. & S	do	160	Do.
Wiles, I. H	H. E	do	160	Held for cancellation.
Willcut, S. O	H. E	Ozark	80	Canceled.
Wyatt, A. M	H. E	Atkansas	160	Proceedings dismissed.
Wynn, Wm. T	H. E	do	160	Patented.
Yarger, B. H	H. E	Prescott	160	Report pending.
Yancey, Jos. J	H. E	Arkansas	160	Outside forest.
York, Hugh H	H. E	Ozark	160	Patented.
Yosemite et al., lodes	M. E	Coronado	25	Proceedings dismissed.
Young, Florence	H. E	Arkansas	160	Canceled.
Zablocki, B. G	H. E	Ozark	160	Do.

DISTRICT NO. 4.

			Acres.	
Cornelius White	Homestead entry	Sawtooth	160	Adverse report submitted.
Kennebec Mining Co	Mineral entry	Wasatch	22	Do.
C. W. Clark	Lieu selection	Humboldt	40	Do.
Do	do	do	40	Do.
Cecil H. Hopf	Desert land entry	Targhee	73	Do.
Kennebec Mining Co	Mineral entry	Wasatch	65	Do.
Fetish Mining Co	do	Sawtooth	16	Do.
Roy H. White	Homestead entry	Boise	120	Do.
Austin Manhattan Manufacturing Co	Mineral entry	Toiyabe	45	Do.
Walter A. Kilgore	Desert land entry	Teton	120	Adverse proceedings directed.
Manhattan Thelma Mining Co	Mineral entry	Toiyabe	7	Do.
Charles Lammersdorf	do	Fillmore	60	Do.
Utah State selection	State selection	Manti	320	Service of charges made.
Gray Trust Co	Mineral entry	Wasatch	440	At issue.
Auto Hill National Mining Co	do	Santa Rosa	120	Do.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 4—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Utah Fertilizer & Chemical Manufacturing Co.	Mineral entry	Caribou	207	At issue.
C. W. Clark	Lieu selection	Humboldt	40	Set for hearing.
Do	do	do	40	Do.
F. A. Hyde & Co	do	Boise	200	Do.
Do	do	do	560	Do.
Do	do	do	240	Do.
Do	do	Minidoka	120	Do.
Do	do	Targhee	400	Do.
Do	do	Palisade	40	Do.
Do	do	Humboldt	40	Do.
Do	do	Minidoka	80	Do.
Do	do	Idaho	40	Do.
Gregory Schoen	Homestead entry	Humboldt	160	Hearing held; awaiting decision, R. and R.
A. E. Anderson	do	Payette	160	Do.
Manhattan Sunshine Mining Co	do	Toiyabe	35	Do.
Jarbidge Hilltop Mining, Milling & Power Co.	do	Humboldt	74	Do.
Inez Simmons	Desert land entry	Targhee	160	Do.
Grover C. Gibbs	Homestead entry	Weiser	120	R. and R. decision in favor of United States.
Idaho Mining & Lumber Co	Mineral entry	Salmon	185	Do.
Francis W. Magner	Homestead entry	Payette	160	Do.
Manhattan Lucky Boy Mining Co	Mineral entry	Toiyabe	35	Do.
Charles Swanson	do	Sawtooth	27	Do.
Seigel Consolidated Mining Co	do	Nevada	20	Do.
Do	do	do	20	Do.
Do	do	do	20	Do.
Job G. Turner	Homestead entry	Weiser	160	R. and R. decision adverse to United States. Appealed.
Great Western Gold & Copper Co	Mineral entry	Wasatch	120	Do.
Geo. L. Zimmerman	Homestead entry	Payette	160	Do.
Mary Ellen Mining & Milling Co	Mineral entry	Wasatch	50	Awaiting decision by commissioner.
James A. Collins	Desert-land entry	Targhee	160	Entry held for cancellation by commissioner.
Rilla Snyder et al	Coal cash entry	Manti	2,800	Do.
M. I. Fowler	Mineral entry	LaSal	20	Entry held for cancellation by commissioner; appealed; brief filed.
Auto Hill National Mining Co	do	Santa Rosa	20	Pending appeal to Secretary of Interior.
State of Idaho (01391)	State selection	Boise	640	Entry held for cancellation by commissioner; appealed to Secretary of Interior.
Mountain Meadow Placer Mining Co	Mineral entry	do	20	Entry canceled.
Black Eagle Gold Mining Co	do	Salmon	21	Do.
Cyrus H. Clark	Homestead entry	Uinta	160	Claimant relinquished.
Manhattan Crescent-Eureka Mining Co.	Mineral entry	Toiyabe	14	Entry canceled.

Mineral Flat Mining Co	do	Wasatch	211	Adverse report withdrawn.
Manhattan Nevada Gold Mines Co	do	Toiyabe	21	Entry canceled.
Zanzibar Mining Co	do	do	40	Claimant relinquished.
F. A. Hyde & Co	Lieu selection	Humboldt	40	Entry canceled.
Do	do	do	40	Do.
Do	do	do	80	Do.
Mountain Lake Mining Co	Mineral entry	Wasatch	20	Adverse report withdrawn.
Gold Development Co. of Utah	do	Fillmore	272	Do.
Samuel Morgan	Homestead entry	Cache	160	Entry patented.
Geo. Morrel	do	Fishlake	160	Entry canceled.
Orson H. Mower	do	Uinta	160	Do.
Outzen Mining Co	Mineral entry	Fillmore	145	Adverse report withdrawn.
State of Idaho	State selection	Boise	40	Selection canceled.
Walter J. Rogers	Desert-land entry	Targhee	320	Claimant relinquished.
William J. Swapp	Homestead entry	Sevier	160	Entry canceled.
Armour Thompson	Desert-land entry	Teton	40	Do.
Manhattan Wolftone Mining Co	Mineral entry	Toiyabe	8	Protest dismissed.
Joseph S. Martin	do	Humboldt	160	Entry canceled.
State of Idaho (01397)	State selection	Boise	640	Selection canceled.
State of Idaho (01398)	do	do	640	Do.
State of Idaho (01401)	do	do	640	Do.

DISTRICT NO. 5.

			Acres.	
Ajax placer (La Grange Water & Power Co.).	Mineral	Stanislaus	45	Adverse report submitted.
Akron placer No. 5 (W. A. La Point, et al.).	do	Plumas	160	Adverse proceedings directed.
Alhambra consolidated placer (Wm. Barklage, et al.).	do	Eldorado	45	Hearing held, pending.
Alles, Henry	Homestead	Sequoia	160	Adverse proceedings directed.
Alpine placer (Loyal W. Williams)	Mineral	Santa Barbara	160	Decision R. and R. in favor of claimant.
Anderegg, Andreas	Homestead	Stanislaus	160	Decision R. and R. in favor of United States.
Anton, Amelia S	Desert land	Kern	160	Adverse report submitted.
Antram consolidated quartz mine (Antram, C. C.).	Mineral	Tahoe	80	Decision R. and R. partly in favor of claimant and partly in favor of Government.
Asher, Robert	Homestead	Cleveland	160	Adverse report submitted.
Avila, Elena	do	Monterey	160	Pending notification of heirs before cancellation.
Babbitt, John	do	Stanislaus	160	Adverse report submitted.
Barnes, Ida	do	Modoc	160	Do.
Bennett, Arthur R	do	Sierra	160	Hearing held, pending.
Bickel, Chas. L	do	Sequoia	160	Decision R. and R. in favor of United States.
Bonetti, Joseph	do	Eldorado	120	Adverse report submitted.
Borbe, August G	do	Stanislaus	80	Do.
Brackett, Leroy B	do	Shasta	160	Hearing held, pending.
Brady, Margaret A	do	Stanislaus	160	Do.
Brown, C. A	do	do	160	Adverse report submitted.
Buckeye lode and millsite (Geo. T. Rolfes).	Mineral	Kern	160	Adverse proceedings directed.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 5—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Bush, W. N	Lieu selection No. 5422.	Stanislaus	80	Adverse proceedings directed.
California, State of, et al	School section	Cleveland	640	Hearing held, pending.
Calmes placer (Wm. Barklage, et al.)	Mineral	Eldorado	44.69	Do.
Caminetti, L. D	Homestead	Tahoe	160	Decision R. and R. in favor of claimant.
Campini, Charles	do	do	160	Decision R. and R. in favor of United States.
Canton and Columbus placers (Canton Mining Co.).	Mineral	Plumas	305.75	Hearing held, pending.
Catto, George	Homestead	Eldorado	200	Adverse proceedings directed.
Cecelia placer (C. W. Clarke)	Lieu selection	Plumas	120	Do.
Central Pacific R. R. Co	Railroad section	Klamath	640	Adverse report submitted.
Do	do	do	395	Do.
Do	do	do	80	Do.
Do	do	do	45	Do.
Do	do	do	640	Do.
Do	do	do	320	Do.
Do	do	do	80	Do.
Do	do	do	80	Do.
Do	do	do	640	Do.
Do	do	do	210	Do.
Do	do	do	640	Do.
Do	do	do	60	Do.
Do	do	do	320	Do.
Do	do	do	760	Do.
Do	do	do	326.08	Do.
Do	do	do	80	Do.
Do	do	do	240	Do.
Do	do	do	640	Do.
Do	do	do	640	Do.
Do	do	do	320	Do.
Clarke, C. W	Lieu selection No. 2548.	Stanislaus	40	Adverse proceedings directed under amended charges.
Do	Lieu selection No. 5135.	Shasta	80	Adverse proceedings directed on substituted charges
Do	Lieu selection No. 6043.	Lassen	160	Do.
Do	Lieu selection No. 3566.	Santa Barbara	160	Do.
Do	Lieu selection No. 5822.	Lassen	160	Do.

Do	Lieu selection No. 5253.	Plumas	40	Do.
Do	Lieu selection No. 5254.	do	80	Do.
Do	Lieu selection No. 6950.	Eldorado	160	Adverse proceedings directed.
Do	Lieu selection No. 6039.	Plumas	40	Do.
Do	Lieu selection No. 2536	Sierra	40	Do.
Do	Lieu selection No. 3564	Santa Barbara	80	Do.
Do	Lieu selection No. 3565.	do	80	Do.
Do	Lieu selection No. 3133.	Shasta	560	Do.
Do	Lieu selection No. 5135.	do	80	Do.
Do	Lieu selection No. 253.	Plumas	40	Do.
Do	Lieu selection No. 5345.	do	200	Do.
Colvin Gulch placer (Harry L. Miller)	Mineral	Trinity	63.76	Hearing held, pending.
Combination Stone placer (Ward & Drum).	do	Sierra	40	Adverse report submitted.
Cooley placer (Wm. Barklage, et al.)	do	Eldorado	160	Hearing held, pending.
Corduroy placer (A. R. Bidwell)	do	Plumas	160	Adverse proceedings directed.
Cornish, Geo. H	Homestead	Stanislaus	160	Adverse report submitted.
Crotta, Alex	do	Tahoe	160	Adverse proceedings directed.
Duchow, J. C	do	Stanislaus	160	Adverse report submitted.
Dworzazak, Margaret H	do	Eldorado	160	Do.
Elizabeth consolidated gold mine (J. M. Little).	Mineral	Plumas	107.65	Decision R. and R. in favor of claimant.
Ethel consolidated mine (Ethel Gold Mining Co.).	do	Tahoe	182.84	Adverse proceedings directed.
Eubanks, Wm. H	Homestead	Sierra	80	Adverse report submitted.
Finnegan, Francis	do	Tahoe	77.96	Decision R. and R. in favor of United States.
Foster, F. C	do	Klamath	160	Adverse proceedings directed.
Glover, C. E	Lieu selection No. 3516.	Shasta	80	Do.
Goldberg, Jacob	Lieu selection No. 3719.	Shasta	40	Adverse proceedings directed under amended charge.
Do	Lieu selection No. 3720.	do	120	Do.
Goodloe, P. V	Homestead	Stanislaus	160	Adverse report submitted.
Gosslin, Wm. C	Lieu selection No. 5045.	Lassen	640	Adverse proceedings directed.
Grandlees, Jno. D	Homestead	Tahoe	160	Decision R. and R. in favor of United States.
Greenhorn Flat consolidated placer (Fred Beaudry).	Mineral	Trinity	1,070	Case remanded for further hearing.
Gremenger, Henry J	Homestead	Eldorado	160	Decision R. and R. in favor of claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 5—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Halsted No. 12 mining location (No. Cal. Min. Co.).	Mineral	Plumas	120	Pending.
Harris, Jacob A	Homestead	Modoc	160	Decision R. and R. in favor of claimant.
Hazel placer (W. J. Clinch)	Mineral	Plumas	160	Pending.
Healey, Julia	Homestead	Trinity	160	Decision R. and R. in favor of claimant.
Heap Ketchum, Vadose and Dynamic Center placers (Gibson, C.).	Mineral	Kern	20	Decision R. and R. in favor of United States.
High Channel placers (Oro Water, Light & Power Co.).	do	Plumas	880	Decision R. and R. partly in favor of United States and partly in favor of claimant.
Hyde, F. A	Lieu selection No. 2259.	Stanislaus	120	Adverse proceedings directed.
Do	Lieu selection No. 3563.	Santa Barbara	80	Do.
Do	Lieu selection No. 2730.	Shasta	40	Do.
Do	Lieu selection No. 6033	Plumas	400	Adverse proceedings directed under amended charges.
Do	Lieu selection No. 3821.	Eldorado	160	Hearing held, pending.
Kinney, John A	Homestead	Stanislaus	153	Adverse proceedings directed.
Kittredge, E. H	Lieu selection No. 6979.	Eldorado	80	Do.
Ledgerwood, J. M	Squatter	Trinity	160	Hearing held, pending.
Ledgerwood, Thos. O	do	do	160	Do.
Ledgerwood, Wm	do	do	160	Do.
Little, E. M	Homestead	Stanislaus	160	Decision R. and R. in favor of United States.
Low, Histon	do	Shasta	160	Adverse proceedings directed.
Manhattan consolidated placer (Manhattan Gold Min. Co.).	Mineral	Plumas	450	Do.
Mann, Mary E	Homestead	Stanislaus	160	Decision R. and R. in favor of United States.
Martin, Samuel	do	Eldorado	160	Do.
Mattly, Frederick D	Desert land	Mono	160	Adverse proceedings directed.
Mayfield, Lora L	Homestead	California	160	Decision R. and R. in favor of United States.
Metzger, Christian, jr	do	Trinity	160	Adverse report submitted.
Mocettini, Regina	do	Eldorado	160	Adverse proceedings directed.
Monotti, Angeline	do	Stanislaus	160	Adverse report submitted.
Morton placer and Mount Washington lode (J. A. Smith).	Mineral	Plumas	160	Hearing held, pending.
Mountain, Howard	Homestead	Tahoe	160	Decision R .and R. in favor of United States.
Murphy, Henry	do	Sequoia	160	Decision R. and R. in favor of claimant.

Nelson, W. J	....do	Stanislaus	160	Do.
Nicholas, Seraphin	....do	Angeles	160	Hearing held, pending.
O'Hara, L. C	....do	Stanislaus	160	Pending.
Palmer, Lee A	....do	Sequoia	160	Adverse report submitted.
Perkiss, Chas. W., and heirs of Elizabeth and T. B. Walker, transferee	Timber and stone.	Modoc	240	Decision R. and R. in favor of claimants.
Pine Tree mine (J. B. Chapin)	Mineral	Cleveland	16	Adverse report submitted.
Prather consolidated quartz mine (Sam'l D. Prather).	....do	Shasta	45.63	Decision R. and R. in favor of claimant.
Rice, C. F	Homestead	Stanislaus	120	Adverse report submitted.
Roberts, Edward	....do	Angeles	40	Do.
Rupley, Joseph	....do	Eldorado	160	Decision R. and R. in favor of claimant.
Sailor mines consolidated placer (Sailor Mines Inc. Gravel Co.).	Mineral	Tahoe	480	Adverse report submitted.
Santa Fe Pacific R. R. Co. (Robert Martin, N. Kutchendorf, H. H. Yard, et al., protestants).	Lieu selection No. 01129.	Plumas	160	Decision R. and R. in favor of United States.
Do	Lieu selection No. 01123.	....do	160	Do.
Self, George	Timber and stone.	Trinity	160	
Senega Larga placer (Glavor, Joseph, et al.	Mineral	Angeles	160	Adverse proceedings directed.
Smith, Jean	Homestead	Kern	160	Hearing held, pending.
Solinsky, E. C	....do	Stanislaus	160	Adverse proceedings directed.
Stage, John H	....do	....do	160	Do.
Stage, Rhoda M	....do	....do	160	Adverse report submitted.
Touminen, John	....do	....do	160	Do.
Valencia, Joseph	....do	....do	160	Decision R. and R. in favor of claimant.
Van Norman, W. H	....do	....do	160	Adverse report submitted.
Walker, Thomas and Benjamin F	Preemption entries	Kern	160	Do.
Walker, Thomas B	Lieu selection No. 655.	Plumas	600	Adverse proceedings directed under substituted charges.
Do	Lieu selection No. 5447.	Shasta	640	Do.
Do	Lieu selection No. 5092.	....do	200	Do.
Do	Lieu selection No. 5261.	Lassen	320	Adverse proceedings directed.
Do	Lieu selection No. 6255.	Plumas	600	Do.
Do	Lieu selection No. 4590.	Modoc	420	Do.
Do	Lieu selection No. 4591.	....do	520	Pending hearing.
Walters, Christian M	Homestead	Stanislaus	160	Adverse report submitted.
Waverly and Marietta placers (Canton Mining Co.).	Mineral	Plumas	630	Hearing held, pending.
White consolidated placer (Quincy Mining & Water Co.	....do	....do	480	Pending.
Whittaker, George	Homestead	Lassen	160	Decision R. and R. in favor of United States.
Willow and Muggins Bar placer (Cataract Gold Mining & Power Co.).	Mineral	Plumas	100	Decision R. and R. in favor of claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 5—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Acme placer No. 3 (Langhorst, Henry J.).	Mineral	Plumas	160	Application rejected.
Akron placer No. 6 (W. A. La Point et al.)	do	do	320	Location canceled.
Albrecht, F. C	Homestead	Cleveland	160	Held for cancellation.
Alder Swamp mining claim (Charles Green).	Mineral	Plumas	40	Relinquished.
Ambrose, W. L	Squatter	Trinity	160	Canceled.
American placer (Columbia Channel Gold Mining Co.).	Mineral	Tahoe	160	Application rejected.
Brady, Mary T	Homestead	Stanislaus	160	Commutation proof rejected; entry intact.
Beatty placer (H. N. Brown et al.)	Mineral	Plumas	40	Proceedings dismissed.
Beatty, William T	Homestead	do	160	Approved for patent.
Becraft, Clarence	Timber and stone.	Lassen	160	Decision in favor of claimant.
Beik, Henry A	Mineral	Tahoe	19.69	Proceedings dismissed.
Bell, Richard	Homestead	California	160	Canceled.
Blair, Matthew E	do	Tahoe	160	Held for cancellation.
Blue Gravel consolidated placer (Metcalf, William).	Mineral	Plumas	560	Application rejected in part and proceedings dismissed.
Bonetti, Henry	Homestead	Eldorado	160	Patented.
Brashear, W. S	do	Lassen	160	Do.
Campbell, J. A	do	Cleveland	160	Do.
Campbell, William	do	Plumas	160	Held for cancellation.
Cleopatra group lode (Jas. D. Lacey)	Mineral	Klamath	491.69	Transferred to district 6.
Clover placers, Nos. 1 to 13 (Chadbourne, F. S.).	do	Plumas	2,080	Location declared void on No. 1; other cases returned to District Forester for further investigation.
Cook, Jacob H	Lieu selection	do	1,280	Land adjudged mineral.
Cook, Jacob H	do	do	160	Do.
Crane, W. L	Squatter	Trinity	160	Location held invalid.
Daniels, Walter L	Homestead	Plumas	160	Held for cancellation.
Dan Patch placer (Robert S. Brown)	Mineral	do	100	Do.
Darlington, Abe	Homestead	Eldorado	160	Proceedings dismissed.
Darlington, Sarah	do	do	160	Held for cancellation.
Dom Good Blowout and Never Sweat Lodes (McCain, Chris & John).	Mineral	Cleveland	20	Location declared void.
Eades, William A	Homestead	Modoc	160	Patented.
Egbert, J. W. & Weyl, E	Mineral (coal)	Plumas	320	Canceled.
Elliott, Myrtle J	Homestead	California	160	Held for cancellation.
Ellison, Claude T	Timber and stone.	Trinity	160	Application rejected.
Eversall, William	Homestead	Sierra	120	Canceled.
Farrington, William	Desert land	Mono	280	Held for cancellation.

Fearon, C. T	Homestead	Monterey	160	Canceled.
Feese, Jesse H	do	Trinity	160	Do.
Finley placer	Mineral	do	80	Claim abandoned.
Forgert, Felix R. O	Homestead	Stanislaus	160	Held for cancellation.
Fortmiller, E. F	Timber and stone	Trinity	160	Application rejected.
Fusch, Mabel	Homestead	do	160	Canceled.
Gius, Gabriele	do	Monterey	160	Do.
Harrell, J. B	do	Tahoe	160	Patented.
High Point placer (Florian Le May)	Mineral	Klamath	39.07	Do.
Hoskins, Samuel W	Homestead	Modoc	160	Canceled.
House, John	do	Cleveland	80	Final proof rejected.
Island Hill consolidated placer	Mineral	Plumas	580	Application rejected in part.
Jasper, Mrs. Harriett	Homestead	Santa Barbara	160	Held for cancellation.
Jeans, John H	do	Trinity	40	Do.
Johnson, H. M	do	Angeles	120	Proceedings dismissed.
Kern, John E	do	Trinity	160	Held for cancellation.
Ledgerwood, W. R	Squatter	do	160	Location held invalid.
Licking placer (W. T. Forson)	Mineral	Plumas	160	Canceled.
McBride, Archie (devisee of Moses Howell.	Homestead	Trinity	160	Patented.
McCarthy, Thomas E	do	Tahoe	160	Held for cancellation.
Maddrell, Joseph	do	Trinity	160.	Canceled.
Marion quartz lode (Beik, Henry A.)	Mineral	Tahoe	19.69	Proceedings dismissed.
Martin, Frank	Homestead	Monterey	160	Decision in favor of United States.
Mattly, Frederick D	do	Mono	160	Canceled.
Mattly, Hannah S	do	do	160	Do.
Mills, L. Leonard	Timber and stone	Plumas	160	Decision in favor of claimant.
Moe, Chester	Homestead	Modoc	160	Canceled.
Mountain Meadows copper mine	Mineral	Lassen	206.4	8 claims canceled; 1 patented.
Nichols, George	Homestead	Cleveland	80	Canceled.
Northern Headlight Mining & Milling Co.	do	Shasta	67.83	Proceedings dismissed.
Owen, Joseph F	do	Eldorado	160	Held for cancellation.
Packard, Otto B	do	do	160	Canceled.
Pillow, James H	Timber and stone	Lassen	160	Canceled in part.
Poplar Grove (Wolters, G. H. & Bidwell, A. R.)	Mineral	Plumas	160	Canceled.
Potts, William	Homestead	Eldorado	160	Held for cancellation.
Pride of Italy placer (Ghidotti, John)	Mineral	Tahoe	160	Relinquished; proceedings dismissed.
Prough, O. A	Homestead	Modoc	160	Canceled.
Reliance placer (Columbia Gold Mining Co.).	Mineral	Tahoe	140	Application rejected.
Robinson, Samuel H	Homestead	Stanislaus	160	Held for cancellation.
Rocky Bar placer (Samuel D. Prather)	Mineral	Klamath	120	Outside National Forest closed.
Round Valley placers (A. R. Bidwell)	do	Plumas		Canceled.
Rupley, John B	Homestead	Eldorado	160	Final certificate authorized.
Santa Fe Pacific R. R. Co	Lieu selection	Plumas	320	Held for cancellation.
Do	do	do	160	Do.
Do	do	do	160	Do.
Smith's Point placer (Warren Olney, jr.)	Mineral	do	80	Relinquished.
Springer, Albert G	Homestead	Eldorado	160	Canceled.
Street, Thomas W	do	Sequoia	160	Do.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 5—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Sweetland, Ellen M	Isolated tract	Stanislaus	40	Held for cancellation.
Toreson, Carl T	Homestead	Modoc	160	Canceled.
Vogt, Charles W	do	Mono	160	Do.
Wagner, Marguerite M	do	Stanislaus	160	Held for cancellation.
Walker, Thomas B	Lieu selection No. 6305.	Plumas	40	Canceled.
Do	Lieu selection No. 6513.	do	240	Held for cancellation.
Do	Lieu selection No. 5606.	do	1,360	Held for cancellation in part.
Weldon, Lora E	Homestead	California	160	Canceled.
Welsh, J. O	do	Shasta	80	Do.
Wilson, Edgar M	Lieu selection	Plumas	160	Proceedings dismissed.
Wilson, George A	Homestead	Tahoe	160	Held for cancellation.
Winchell, Geraldine	do	Sierra	160	Decision in favor of claimant.
Wohlert, George	do	Mono	100	Canceled.
Wood, William W	do	Sierra	160	Held for cancellation.
Wright, John	do	Stanislaus	160	Secretary's office on appeal.
Walker, Thomas B	Lieu selection No. 1281.	Shasta	671,51	Motion for issuance of patent denied.

DISTRICT NO. 6.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Alaska Anthracite Coal Co	Spokane, Virginia, Rossland, Green, and Abernethy claims, Juneau 0837.	Chugach	800	Adverse proceedings directed; hearing applied for.
Alaska Petroleum & Coal Co. and John L. Moseley et al.	Summit et al lodes, C. D. S. 37-47 and C. D. S. 520, Juneau 0308.	do	1,639	Preliminary and final hearing held.
Alaska Smokeless Coal Co	Aurora coal claims, Nos. 1-8, including C. S. 293-299 and 311, Juneau 0490.	do	991	Adverse proceedings directed; hearing applied for.
Alaska Industrial Co	Texas Group lode, M. S. 886, Seattle 01385.	Tongass	331	Adverse report submitted.

Albert, Geo. W. H	Homestead squatter, Roseburg	Crater	160	Decision of commissioner declaring claim invalid subject to right of appeal.
Albert, Mary A	Homestead squatter, Roseburg 06343	do	160	Decision of R. and R. in favor of claimant; motion to set aside decision filed by chief of field division.
Andrews, Oliver S	T. and S. 8727, La Grande 06873	Umatilla	120	Decision of commissioner holding entry for cancellation.
Apple, Finley E	H. E. 19028, Seattle 01136	Olympic	160	Decision of R. and R. in favor of United States.
Arbogast, Ora	H. E. 7111, La Grande 07533	Umatilla	160	Decision of R. and R. in favor of claimant.
Arwine, Lee	T. and S. 768, The Dalles 07056	Deschutes	160	Hearing set; postponed indefinitely at request of claimant.
Assenheimer, Fred	H. E. 13569, Roseburg 03749	Siuslaw	160	Decision of commissioner holding entry for cancellation.
Aune, George (deceased); Aune, Arnt, claimant.	H. E. 3194, Lakeview 0939	Paulina	160	Adverse proceedings directed; hearing applied for.
Ayers, Aldred L	T. and S. 8557, La Grande 06867	Umatilla	160	Decision of commissioner holding entry for cancellation.
Ayers, William	T. and S. 8563, La Grande 06869	do	160	Do.
Aztec Land & Cattle Co., Mitchell, Chas. F., assignee.	H. E. 07509, Roseburg	Cascade	160	Adverse report submitted; application allowed to remain intact by commissioner.
Babcock, L. A	Sunset Mill Site, No. 135, Juneau	Tongass	5	Hearing held.
Bailey, Henrietta A	T. and S. 4353, Lakeview 03225	Crater	160	Decision of R. and R. in favor of United States; appealed by claimant.
Barker, Benton H	H. E. 13346, Roseburg 03648	Siuslaw	160	Decision of R. and R. in favor of claimant; appealed by United States.
Barnett, David J., and Smith, J. E	Forest lieu selection 3507 La Grande 02157.	Wenaha	640	Hearing set; postponed at request of claimants.
Benham, Henry A	H. E. 13804, Vancouver 02107	Columbia	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Bohemia Gold Mining Co	Paradise group of lodes, M. S. 625, Roseburg 04565.	Umpqua	17	Adverse proceedings directed.
Bonanza Queen Mining Co	Bonanza Queen group of placers, M. E. 183, Seattle 0803.	Snoqualmie	158	Decision of commissioner holding entry for cancellation; appealed by claimant.
Bowtle, Catherine	C. D. S., Seattle 02205	Washington	160	Adverse report submitted.
Bradshaw, Ready H	H. E. 13474, Roseburg 03706	Crater	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Breeding, Lee	H. E. 14974, Portland 01975	Siuslaw	160	Decision of commissioner holding entry for cancellation.
Brier, A. D	Homestead squatter, Lakeview 04207	Crater	160	Decision of R. and R. in favor of claimant.
Britton, G. O	Martin coal claim, C. D. S., Juneau 0952.	Chugach	90	Set for hearing.
Brooks, Philip R	C. D. S., Seattle 02245	Washington	160	Canceled; entry reinstated and hearing allowed by commissioner.
Brown, Edward	T. and S. 8586, La Grande 06871	Umatilla	160	Decision of commissioner holding entry for cancellation.
Brown, H. H	Vermont Association placer, M. S. 976, Seattle 01927.	Snoqualmie	160	Hearing set, but postponed indefinitely at request of claimants.
Brown & Hardin et al	Salt Creek Springs lodes, Roseburg 07631.	Cascade	40	Decision of R. and R. in favor of claimant; appealed by United States.
Broyles, Lorenzo F	H. E. 13919, Vancouver 0339	Columbia	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Bunker Hill Mining & Smelting Co	Isabell et al. lodes, M. S. 987, Seattle 02263.	Snoqualmie	40	Adverse proceedings directed; hearing applied for.
Do	Copper Bell et al. lodes, M. S. 855, Seattle 02585.	do	33	Adverse report submitted on part of claim.
Bush, Walter N	Forest lieu selection 3423, Vancouver 01005.	Columbia	360	Adverse proceedings directed; hearing applied for.
Butler, Harold H	H. E. 19598, Seattle 01278	Olympic	160	Decision of commissioner holding entry for cancellation; appealed by claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Callahan, L. W	Homestead squatter, Seattle 0772	Snoqualmie	160	Adverse proceedings directed on amended charges; hearing applied for; reinvestigation by chief of field division directed by commissioner.
Camps, Frank L	H. E. 11644, Roseburg 01142	Crater	160	Decision of commissioner in favor of United States; appealed by claimant.
Carbon Coal Association	C. E., Seattle 01741	Washington	560	Adverse report submitted.
Carbon Mountain Coal Co	Carbon Mountain consolidated coal claim, C. S. 156, 157, 159, 160, Juneau 0115, 0116, 0117, 0118.	Chugach	639	Adverse proceedings directed.
Carnes, Thos. J	H. E. 13110, Roseburg 03099	Siuslaw	160	Decision of commissioner holding entry for cancellation.
Carter, Alta E	C. D. S., Roseburg 02237	Siskiyou	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Carter, Cecil	C. D. S. 66, Roseburg 02234	do	160	Do.
Carter, Roy E	H. E. 14349, La Grande 04471	Minam	160	Adverse proceedings directed.
Cascade Coal Association	C. D. S. 653, Vancouver 01048	Rainier	480	Decision of R. and R. in favor of United States.
Cavanaugh, Chas	Homestead squatter, Seattle 0807	Snoqualmie	160	Hearing set; postponed indefinitely at request of Forest Service until respective rights of claimant and N. P. Ry. can be determined; claim in odd section of primary grant.
Check, Eric O	H. E. 3048, Lakeview 014	Fremont	160	Decision of R. and R. in favor of United States; appealed by claimant.
Chicago Golden Crown Mining Co	Silver Bell et al. lodes, M. E. 15, M. S. 850, Vancouver 02428.	Columbia	166	Adverse proceedings directed.
Clarke, C. W. (Brown Bros. transferees)	Forest lieu selection 3059, Seattle 01849	Washington	1,120	Adverse proceedings directed; hearing applied for.
Cleopatra Development Co	Alaska, Arizona, et al. lodes, M. S. 4560, Eureka 0554.	Siskiyou	492	Hearing held.
Coe, H. W	Denmark Discovery & Norway N. W. Discovery, and Norway millsites, Vancouver.	Columbia	5	Hearing set; action suspended pending determination validity of conflicting mill sites.
Cofeen, Frederick H	T. and S. 784, The Dalles 06529	Ochoco	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Coffman, Thos. J	C. D. S. 636, Vancouver 01511	Rainier	160	Hearing held.
Collins, Wm	H. E. 14604, Roseburg 04306	Siuslaw	160	Adverse report submitted.
Compton, M. D	Homestead squatter, Seattle 02098	Snoqualmie	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Cordes, H. G	H. E. 13744, Vancouver 02096	Columbia	160	Do.
Cordes, Romauld C	H. E. 12419, Roseburg 03438	Siuslaw	160	Do.
Cothary, Wm. H	H. E. 3021, Olympia 013	Rainier	80	Adverse report submitted.
Courtwright, James F	C. D. S. 646, Vancouver 01518	do	160	Hearing held.

Cox, Patrick	Homestead squatter, Seattle	Snoqualmie	160	Adverse report submitted; investigation by chief of field division directed; favorable report submitted by special agent; case now awaiting report from field as to bona fides of application.
Crabtree, Edmund L	T. and S. 978, Lakeview	Paulina	160	Adverse proceedings directed.
Creedican, Thomas	Homestead squatter, Seattle 0681	Snoqualmie	160	Adverse proceedings directed; claimant filed motion to dismiss proceedings; hearing directed.
Crisemon, Louise	H. E. 2846, Lakeview 01013	Paulina	160	Decision of commissioner holding entry for cancellation; appealed by claimant; Secretary directed new hearing.
Crowley, Arthur L	H. E. 15106, La Grande 04859	Malheur	160	Adverse proceedings directed.
Crystal Consolidated Mining Co	Crystal lode, M. S. 572, Roseburg 04672	Umpqua	21	Decision of R. and R. in favor of United States (default).
Dahack, Zera	Homestead squatter, Roseburg 06352	Crater	160	Decision of R. and R. in favor of claimant.
Damitio, Richard P	H. E. 2843, Olympia	Olympic	160	Application to reinstate entry denied by commissioner; appeal filed by claimant from decision.
Darnell, Robert E	H. E. 13870, Vancouver 0506	Columbia	160	Decision of commissioner rejecting final proof subject to right of appeal.
Davolt, James W	H. E. 13888, Vancouver 01635	do	160	Decision of commissioner dismissing proceedings; appealed by Solicitor.
Demorest, Walter O	H. E. 19609, Seattle 01286	Olympic	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Dennis, A. A	C. D. S. 631, Vancouver 01221	Rainier	160	Hearing held.
Divelbiss, Newton	Acme Emergency placers, Roseburg 06872.	Siskiyou	160	Adverse report submitted.
Doak, Frank T	T. and S. 765, The Dalles 06531	Ochoco	160	Decision of commissioner holding application for rejection.
Doak, William H	T. and S. 807, The Dalles 06528	do	160	Do.
Downing, J. H	Homestead squatter, Roseburg 06399	Crater	160	Decision of R. and R. in favor of claimant.
Druse, Eva P	C. D. S. 645, Vancouver 01514	Rainier	160	Hearing held.
Dupea, Geo. C	C. D. S. 661, Vancouver 01332	do	160	Do.
East Creek Coal Association	C. D. S. 665, Vancouver 01573	do	640	At date of hearing this case was submitted on stipulation and agreed statement of facts; commissioner rejected stipulation and requested further showing.
Eberhard, Geo	Homestead squatter, Seattle 0869	Snoqualmie	160	Set for hearing.
Eggan, Alfred J	H. E. 9441, Waterville 0281	Chelan	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Elwood, James	Forest lieu selection 6522, Portland 0938.	Umpqua	40	Adverse proceedings directed; hearing applied for.
Do	Forest lieu selection 6606, Portland 02281.	do	40	Do.
Do	Forest lieu selection 7057, Seattle 01783.	Olympic	40	Do.
Emerson, E. E	Homestead squatter, Roseburg 06325	Crater	160	Decision of commissioner rejecting application to enter, subject to right of appeal.
Fife, Ashton L	H. E. 13275, Vancouver 02992	Columbia	160	Decision of commissioner holding entry for cancellation.
Flannigan, James	C. D. S. 69, Roseburg 02233	Siskiyou	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Frankoviz, Joseph	C. E. Seattle 0949	Washington	160	Adverse proceedings directed; hearing applied for.
Fuller, Charles W	T. and S. 8553, La Grande 06883	Umatilla	160	Decision of commissioner holding entry for cancellation.
Fuller, Emma C	T. and S. 8556, La Grande 06868	do	160	Do.
Fuller, Maurice	H. E. 13755, Vancouver 01638	Columbia	160	Do.
Galbraith, J. E., et al	Moose Association placer, M. E. 1009, 1010, 1011, and 1012, Seattle.	Snoqualmie	640	Adverse report submitted.
Garner, Naomie	T. and S. 8529, La Grande 05913	Umatilla	160	Decision of commissioner holding entry for cancellaton.
Gibson, Andrew A	H. E. 10242, Roseburg 05449	Siuslaw	160	Decision of R. and R. in favor of United States; appealed by claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Girdwood, James	H. E. 01376, Juneau	Chugach	80	Adverse report submitted.
Glacier Coal Co	C. D. S., Seattle 01428	Washington	160	Adverse report submitted; commissioner directed chief of field division to make joint investigation with Forest Service.
Gold Myer Hot Springs Co	Hot Stuff Cascade lode, Seatttle	Snoqualmie	35	Adverse proceedings directed.
Golden Rule Consolidated Mining & Milling Co.	Jonathan, Damon, et al., lodes, Roseburg 0173.	Umpqua	138	Decision of commissioner dismissing proceedings; appealed by Solicitor.
Green, Merrit A	Soldier's additional H. A., Juneau 0307.	Chugach	Not given.	Hearing held.
Greiner, Jos., jr	Homestead squatter, Seattle 02162	Snoqualmie	160	Decision of commissioner holding entry for cancellation; appealed by claimant.
Greiner, Joseph, sr	Homestead squatter, Seattle 02099	do	160	Do.
Gulden, George C	H. E. 14202, The Dalles 04395	Umatilla	160	Decision of R. and R. in favor of claimant.
Haertle, John	T. and S. 6551, Roseburg 02045	Crater	160	Decision of commissioner dismissing proceedings; action delayed on account of private contest.
Hammersley, John A	H. E. 13333, Roseburg 03644	Siuslaw	160	Decision of R. and R. in favor of United States.
Hammond, Arthur	C. D. S. 0585, Roseburg	Siskiyou	160	Decision of Secretary in favor of United States; papers transmitted to department on motion for rehearing.
Harkness, Orah	T. and S., Roseburg 04732	Umpqua	160	Adverse proceedings directed; hearing applied for.
Harris, N. O	Homestead squatter, Portland 02762	Siuslaw	160	Decision of commissioner holding claim invalid, subject to right of appeal.
Hartley, Leonard	Homestead squatter, Roseburg 05010	Siskiyou	160	Adverse proceedings directed.
Hartline, John M., et al	Hartline consolidated coal claim, coal survey 422, Juneau 01407.	Chugach	2,290	Adverse proceedings directed; hearing applied for.
Hartman, John P., et al	C. D. S. 39, Vancouver 01504	Rainier	360	Hearing held.
Haumesser, Joseph	Homestead squatter, Olympia 024	Olympic	160	Adverse proceedings directed.
Havird, Harvey	H. E. 13889, Vancouver 01637	Columbia	160	Decision of commissioner dismissing proceedings; appealed by Solicitor.
Hayes, Peter W	Homestead squatter, Roseburg 07626	Siskiyou	160	Hearing set.
Higgins, Delenzo (heir of Marion Higgins).	H. E. 12508, Roseburg 02621	do	160	Do.
Hillhouse, Victor	Homestead squatter, Waterville 03343.	Okanogan	160	Adverse report submitted.
Hinton, Douglas H	C. D. S., Seattle 0823	Washington	160	Hearing set; postponed indefinitely at request of claimant.
Hoban, Thomas	Homestead squatter, Seattle	Snoqualmie	160	Adverse proceedings directed; hearing postponed until respective rights of squatter and conflicting lieu selector are determined.
Hoglund, Svan	H. E. 4793, Eureka 01401	Siskiyou	160	Decision of R. and R. in favor of claimant.
Hoover, Thos	Homestead squatter, Seattle	Snoqualmie	160	Adverse proceedings directed.
Hopkinson, Edwin W	Homestead squatter, Vancouver 01565.	Columbia	160	Do.
Humphreys, Arthur E	T. and S. 8565, La Grande	Umatilla	160	Decision of commissioner holding entry for cancellation.
Humphreys, Cecil T	T. and S. 8559, La Grande 06878	do	160	Do.

Humphreys, Harvey	T. and S. 8587, La Grande 06865	do	160	Do.
Humphreys, Thomas J	T. and S. 8528, La Grande 06879	do	160	Do.
Hyde, F. A., & Co	Forest lieu selection 1582, Vancouver 03793.	Columbia	40	Adverse proceedings directed; hearing applied for.
Do	Forest lieu selection 1586, Vancouver 03994.	do	360	Do.
Do	Forest lieu selection 2651, Seattle 02448.	Snoqualmie	320	Do.
Do	Forest lieu selection 2663, Seattle 02458.	Washington	120	Do.
Do	Forest lieu selection 2668, Seattle 01916.	Snoqualmie	40	Commissioner overruled appellant's motion to dismiss proceedings; appealed by claimant.
Do	Forest lieu selection 2686, Seattle 01917.	Washington	80	Hearing set; postponed at request of claimant.
Do	Forest lieu selection 2988, Seattle 01918.	Snoqualmie	160	Adverse proceedings directed; hearing applied for.
Do	Forest lieu selection 2992, Seattle 02434.	do	80	Do.
Do	Forest lieu selection 3057, Seattle 01821.	do	80	Do.
Do	Forest lieu selection 3058, Seattle 01820.	do	80	Do.
Do	Forest lieu selection 3062, Seattle 01831.	do	160	Do.
Do	Forest lieu selection 3068, Seattle 01825.	do	160	Hearing set; postponed at request of claimant.
Do	Forest lieu selection 3123, Seattle 01848.	do	120	Adverse proceedings directed; hearing applied for.
Do	Forest lieu selection 3203, Seattle 01919.	do	120	Commissioner overruled appellant's motion to dismiss proceedings; appealed by claimant.
Do	Forest lieu selection 3205, Seattle 01861.	do	640	Do.
Do	Forest lieu selection 3420, Vancouver 01006.	Columbia	240	Adverse proceedings directed.
Do	Forest lieu selection 3468, Roseburg 05734.	Siskiyou	160	Adverse proceedings directed; hearing applied for.
Do	Forest lieu selection 3469, Roseburg 04993.	do	160	Do.
Do	Forest lieu selection 3498, Roseburg 04995.	do	40	Set for hearing; postponed at request of claimant.
Do	Forest lieu selection 3503, Roseburg 04991.	do	120	Adverse proceedings directed; hearing applied for.
Do	Forest lieu selection 3504, Roseburg 04992.	do	120	Do.
Do	Forest lieu selection 3784, La Grande 08560.	Wenaha	160	Adverse proceedings directed.
Do	Forest lieu selection 3957, Roseburg 05084.	Siskiyou	200	Set for hearing; postponed at request of claimant.
Jamison, Geo. W	H. E. 19225, Olympia 01176	Olympic	160	Hearing held.
Jeffers, Chas. W	Homestead squatter, Roseburg 06320	Crater	160	Decision of R. and R. in favor of claimant.
Jenkins, Frank	H. E. 13907, Vancouver 0457	Columbia	160	Commissioner held entry for cancellation; appealed by claimant.
Johnson, Ira G	H. E. 11502, Roseburg 02882	Crater	160	Decision of R. and R. in favor of claimant.
Jones, Louis F	H. E. 13988, Vancouver 0631	Columbia	160	Commissioner held entry for cancellation; appealed by claimant.
Karshner, Hubert I. (insane), Louisa Karshner, guardian.	H. E. 2854, Olympia 01114	Olympic	160	Decision of R. and R. in favor of claimant.
Katalla Co	Soldier's additional, U. S. Survey 633 and 630, Juneau 071 and 089.	Chugach	Not given.	Commissioner directed issuance of final certificate; appealed by Solicitor.
Kay, J. M	H. E. 18223, Seattle 01663	Olympic	160	Commissioner held entry for cancellation; appealed by claimant.
Kelly, Ambrose	H. E. 14574, La Grande 03329	Whitman	160	Decision of R. and R. in favor of United States; appealed by claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Keplinger, Clarence C.	C. D. S., Seattle 02131	Washington	160	Adverse proceedings directed; hearing applied for.
Kerr, Addie	T. and S. 10882, Roseburg 03137	Siskiyou	160	Set for hearing.
Kincaid, Archie R.	H. E. 13725, Roseburg 03809	Crater	160	Commissioner dismissed proceedings subject to right of appeal by United States.
Krulikoski, Joseph	Homestead squatter, Seattle 02093	Snoqualmie	160	Commissioner held entry for cancellation; appealed by claimant.
Lange, Robert C.	H. E. 14272, Vancouver 02295	Columbia	160	Do.
Do	Dipper Discovery mill site, Vancouver 02704.	do	5	Hearing held; action suspended pending result of adverse claim; now before superior court of Skamania County.
Lapham, J. A.	Homestead squatter, Seattle 02088	Snoqualmie	160	Commissioner held entry for cancellation; appealed by claimant.
Laughlin, John	H. E. 2395, Lakeview 04053	Crater	160	Decision of R. and R. in favor of claimant.
Lawrence, John C.	H. E. 14455, Roseburg 04197	Umpqua	160	Do.
Leezer, Mabel America	T. and S. 8551, La Grande 06880	Umatilla	160	Commissioner held entry for cancellation.
Lightfoot, Charles C.	C. A., Seattle 0885	Washington	160	Hearing held.
Linck, John W.	C. D. S. 651, Vancouver 01572	Rainier	160	Decision of R. and R. in favor of claimant.
Lindsay, Elmer	T. and S. 3555, La Grande 06875	Umatilla	160	Commissioner held entry for cancellation.
Lindsay, Margaret	H. E. 11567, Roseburg 02866	Crater	160	Decision of R. and R. in favor of claimant.
Lindsay, William	H. E. 11568, Roseburg 02235	do	120	Do.
Lockhart, Herbert	C. D. S. 71, Roseburg 02235	Siskiyou	160	Decision of commissioner in favor of United States; appealed by claimant.
Lockhart, Louise	C. D. S. 72, Roseburg 02236	do	160	Do.
Loftin, Sarah E.	T. and S. 810, The Dalles 06532	Ochoco	160	Do.
Loftin, Wilburn H.	T. and S. 771, The Dalles 06530	do	160	Do.
Lowry, Lucinda E.	H. E. 19342, Seattle 0311	Washington	160	Forest Service recommended to chief of field division that adverse proceedings be dismissed.
Lucart, Robert P.	H. E. 13796, Vancouver 01542	Columbia	160	Hearing held.
Lynch, Oliver	H. E. 12446, La Grande 03854	Whitman	160	Adverse proceedings directed; hearing applied for.
Lysons, Albert C.	H. E. 13891, Vancouver 01634	Columbia	160	Decision of commissioner in favor of claimant, subject to right of appeal by United States.
McBride, C. C.	H. E. 13854, Roseburg 03860	Siuslaw	120	Hearing set.
McCluskey, T. W.	H. E., Roseburg 05536	Umpqua	160	Do.
McCue, William	C. D. S., Waterville 05786	Wenatchee	160	Adverse proceedings directed.
McCumber, Lloyd	H. E. 15392, The Dalles 04028	Oregon	160	Adverse report transmitted to Solicitor; no final proof filed; pending.
McDonald, Norman (heirs of), Mrs. Viola House, claimant.	Homestead squatter, Waterville 0992	Colville	160	Adverse proceedings directed; commissioner directed R. and R. to issue notice of charges on all heirs; R. and R. report still trying to get service on heirs.
McLean, Angus	Homestead squatter, Seattle 0863	Snoqualmie	160	Forest Service recommended to chief of field division that adverse proceedings be dismissed.

Mahoney, M	Homestead squatter, Roseburg 06512	Crater	160	Decision of R. and R. in favor of United States.
Maki, John	H. E. 15684, Portland 01200	Siuslaw	160	Decision of R. and R. in favor of United States, but recommended that commutation be allowed.
Maloney, John, et al	Skykomish Association placer, M. S. 988, Seattle 02123.	Snoqualmie	120	Adverse report submitted.
Manning, Mrs. Fannie (widow of A. L. Manning, deceased).	Homestead squatter, Seattle	do	160	Adverse proceedings directed.
Marsh, A. J	T. and S. 10695, Roseburg 03136	Siskiyou	160	Hearing set.
Martin, Killes J	Butterfly and Ranchers placers, M. S. 260, La Grande 01442.	Wallows	125	Decision of commissioner denying claimant's application to amend entry and holding entry for cancellation; appealed by claimant.
Meadows, Manervia	T. and S. 8519, La Grande 06863	Umatilla	160	Commissioner held entry for cancellation.
Mills, John	T. and S. 8562, La Grande 06861	do	160	Do.
Mitchell, Chas. F. (assignee of Clara W. Kanaga).	Soldier's additional, H. E., Roseburg 07508.	Cascade	120	Adverse report submitted.
Morrell, Sam	H. E. 19332, Seattle	Washington	160	Adverse report submitted; awaiting final proof.
Morris, Frank	Homestead squatter, Roseburg	Siskiyou	160	Adverse report submitted.
Morris, R. L	Homestead squatter, Roseburg 07625	do	160	Hearing set.
Morrison, S. S	Homestead squatter, Roseburg 07192	Umpqua	160	Decision of R. and R. in favor of claimant.
Murphy, John L	H. E. 13487, Roseburg 07192	Siuslaw	160	Adverse report submitted.
Neal, Oscar F	H. E. 13487, Roseburg 06862	Umatilla	160	Commissioner held entry for cancellation.
Nichols, J. B., and Smith, Cy	Meadow placers Nos. 1 and 2, La Grande 07670.	Minam	320	Decision of R. and R. in favor of United States; appealed by claimant.
Nicholson, Chas. E	H. E. 12418, Roseburg 03437	Siuslaw	160	Commissioner held entry for cancellation; appealed by claimant.
Nisqually Coal Association	C. D. S. 652, Vancouver 0631	Rainier	640	Decision of R. and R. in favor of United States.
Nonpareil Consolidated Copper Co	Blue Mud et al. lodes, M. S. 929, Seattle 01993.	Snoqualmie	653	Adverse proceedings directed; hearing applied for.
Northern Improvement Co	Chezum group of coal claims, C. D. S. 300 to 309, inclusive, and 316, Juneau.	Chugach	1,758	Do.
Northern Pacific Ry. Co. (Weyerhauser Land Co., transferee).	Forest lieu selection, Portland	Siuslaw	160	Hearing set; postponed at request of claimants.
O'Hara, E., and Hill, J. L	Ironside and El Dorado lodes, Portland	Santiam	20	Adverse proceedings directed; hearing applied for.
Olsen, Otis S	H. E. 12044, La Grande 02847	Wallowa	160	Department of Agriculture notified General Land Office that no objection to issuance of patent.
Orander, W. H	C. D. S. 633, Vancouver 01517	Rainier	160	Hearing held.
Pacific Coast Gypsum Manufacturing Co.	Gypsum, Gypsum No. 1, et al. placers, M. E. 48, Juneau 01363.	Tongass	57	Commissioner canceled entry in part.
Palmer, Harrietta A	H. E. 8626, Waterville	Okanogan	160	Adverse proceedings directed.
Parks, B. F	Homestead squatter, Olympia 0539	Olympic	160	Adverse proceedings directed under amended charges.
Pickens, S. D	H. E. 9203, Roseburg 05385	Santiam	160	Commissioner held entry for cancellation; appealed by claimant.
Pierson, Cornelius K	C. D. S., Roseburg 0180	Siskiyou	160	Decision of Secretary in favor of United States; papers transmitted to department on motion for rehearing.
Pierson, Elias	C. D. S., Roseburg 0178	do	160	Do.
Pierson, J. A	C. D. S., Roseburg 0145	do	160	Do.
Pierson, Z. P	C. D. S., Roseburg 0587	do	160	Do.
Pigott, Michael, et al	Roosevelt Association placer, M. S. 979, Seattle 02010.	Washington	160	Hearing set; postponed at request of claimant.
Pittsburg Coal Co	Sunshine et al. lodes, Juneau 0862	Chugach	6,896	Adverse proceedings directed; hearing applied for.
Plessinger, Wallace	H. E. 7814, Waterville 02766	Okanogan	160	Decision of R. and R. in favor of United States; appealed by claimant.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—**Continued.**

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Powers, E.	C. E. Seattle 0842	Washington	160	Hearing set; postponed indefinitely at request of claimant.
Princeton Mining & Milling Co.	Princeton placer mineral marble claims, Juneau 0864.	Tongass	18	Adverse report submitted.
Pruyn, William E.	T. and S. 8516, La Grande 06864	Umatilla	160	Commissioner held entry for cancellation.
Pulford, S.	C. D. S. 70, Roseburg 02232	Siskiyou	160	Commissioner decided in favor of United States; appealed by claimant.
Reeves, S.	C. D. S., Roseburg 0146	do	160	Decision of Secretary in favor of United States; papers transmitted to department on motion for rehearing.
Reither, S. J.	H. E. 13182, Vancouver 01924	Columbia	160	Adverse proceedings directed.
Roberts, Ephraim F.	H. E. 2914, Lakeview 039	Paulina	160	Commissioner held entry for cancellation; appealed by claimant.
Robinette, H. J.	Homestead squatter, Roseburg	Umpqua	160	Adverse report submitted.
Robinson, James T.	T. and S. 675, The Dalles 07631	Ochoco	160	Commissioner decided in favor of United States; appealed by claimant.
Romaine, J. W., and Roth, Chas. I.	Whistler mill site, M. S. 977, Seattle 02239.	Washington	5	Decision of R. and R. in favor of United States.
Rootwick, Enoch B.	Homestead squatter, Seattle 01943	Snoqualmie	160	Decision of R. and R. in favor of United States; motion for new trial denied by R. and R.
Rotter, Adolph	C. D. S. 662, Vancouver 01331	Rainier	160	Hearing held.
Rotter, Vincent	C. D. S. 663, Vancouver 01330	do	160	Adverse report submitted.
Sagendorf, Sherrill	H. E. 14845, Portland 01001	Siuslaw	160	Hearing held.
Saindon, E. L.	Homestead squtter, Seattle 02117	Snoqualmie	160	Claim declared invalid by commissioner; application for rehearing filed by defendant.
Saling, Allen W.	T. and S. 8564, La Grande 06870	Umatilla	160	Commissioner held entry for cancellation.
Schoenberg, August	Homestead squatter, Portland 02869	Oregon	160	Hearing held.
Schoenberg, Barney	Homestead squatter, Portland 02868	do	160	Do.
Schultz, Roy W.	H. E. 13844, Roseburg 03857	Siuslaw	160	Adverse proceedings directed.
Scofield, Andrew L., et al	Cunningham group of coal claims, Juneau.	Chugach	5,250	Commissioner held claims for cancellation; appealed by claimants.
Scott, J. N.	Victoria et al. lodes, M. S. 918, Seattle 0626.	Snoqualmie	145	Adverse proceedings directed.
Scott, W. W.	Homestead squatter, Roseburg 06321	Crater	160	Decision of R. and R. in favor of claimant.
Scrivner, Mattie B.	T. and S. 8552, La Grande 06872	Umatilla	160	Commissioner held entry for cancellation.
Scrivner, William P.	T. and S. 8539, La Grande 06877	do	160	Do.
Seibert, R. D. (deceased), Chas. R. Seibert, claimant.	Homestead squatter, Spokane	Colville	160	Adverse proceedings directed; hearing applied for.
Servis, L.	Homestead squatter, Seattle 02094	Snoqualmie	160	Commissioner held entry for cancellation.
Shaw, Fred L.	T. and S. 5943, La Grande 0270	Whitman	160	Do.
Shaw, J. C.	C. D. S., Seattle 02138	Washington	160	Adverse report submitted.

Skagit Lime & Cement Co.	Paystreak Association placer, M. S. 968, Seattle 02014.	....do.	157	Adverse proceedings directed; hearing applied for.
Smail, John M.	H. E. 9870, Waterville 0911.	Okanogan.	160	Decision of R. and R. in favor of claimant.
Smith, Chas. A.	Forest lieu selection 3498, Roseburg 04995.	Siskiyou.	40	Adverse proceedings directed.
Smith, H. C.	C. E., Seattle 0978.	Washington.	160	Adverse proceedings directed; hearing applied for.
Smith, Martin V.	H. E. 1913, Burns 01328.	Ochoco.	160	Do.
Smith, Newton L.	Homestead squatter, Roseburg.	Crater.	160	Commissioner decided claim invalid, subject to right of appeal.
Smith, Perry D.	H. E. 9173, Waterville 0523.	Okanogan.	160	Adverse report submitted.
Smith, Thomas.	H. E. 2746, Burns 01115.	Malheur.	160	Commissioner held claim for cancellation; appealed by claimant.
Snyder, J. C. (Rhode Greene, transferee)	Silver Spray placer, Vancouver 01663.	Rainier.	20	Decision of R. and R. in favor of claimant.
Spencer, Anna F.	T. and S. 8515, La Grande 06884.	Umatilla.	160	Commissioner held entry for cancellation.
Spencer, Septimous.	T. and S. 8598, La Grande 06885.	....do.	160	Do.
Stafford, John T.	H. E. 13773, Vancouver 02100.	Columbia.	160	Commissioner held entry for cancellation; appealed by claimant.
Stannard, Geo. A.	Homestead squatter, Roseburg 07157.	Crater.	160	Decision of R. and R. in favor of United States; appealed by claimant.
Stanton, Edwin.	H. E. 14865, The Dalles 0506.	Oregon.	160	Commissioner denied application to reinstate entry.
Steele, John A.	Stracey Group, coal surveys 73 and 75, 255-290, inclusive, and 292, Juneau.	Chugach.	5,917	Adverse proceedings directed; hearing applied for.
Stratton, Abram M.	T. and S. 770, The Dalles 07057.	Deschutes.	160	Decision of R. and R. in favor of United States.
Stratton, Percy C.	H. E. 13197, Roseburg 03896.	Crater.	160	Adverse proceedings directed; hearing applied for.
Stuart, John P.	C. D. S., Seattle 01057.	Washington.	160	Hearing set; postponed indefinitely at request of claimant.
Swab, Mike.	Homestead squatter, Olympia 0224.	Snoqualmie.	160	Hearing set; proceedings held in abeyance by commissioner until respective rights of N. P. Ry. and claimant are determined; land in odd section within primary grant to railroad.
Swager, Frank H.	H. E. 13890, Vancouver 01636.	Columbia.	160	Commissioner dismissed proceedings; appealed by Solicitor.
Tanner, Joel E.	H. E. 13771, Vancouver 0967.	....do.	160	Commissioner held entry for cancellation.
Texor, Clinton.	H. E. 13226, Roseburg 03612.	Crater.	160	Adverse report submitted.
Tharp, Alonzo G.	H. E. 13175, Portland 0230.	Siuslaw.	160	Decision of R. and R. in favor of claimant.
Vanderbilt, Cornelius.	C. D. S. 86, North Yakima 0478.	Wenatchee.	40	Adverse proceedings directed; hearing applied for.
Wachtman, H. J.	C. D. S. 660, Vancouver 01333.	Rainier.	160	Hearing held.
Walton, Katie I.	T. and S. 2279, La Grande 010236.	Umatilla.	160	Adverse proceedings directed.
Wardell, James.	Wardell group of coal claims, C. D. S. 192, 193, 194 and 341, Juneau 0121, 0103, 0104, and 0102.	Chugach.	640	Preliminary and final hearing held.
Warren, Henry E.	T. & S. 8588, La Grande 06882.	Umatilla.	160	Commissioner held entry for cancellation.
Watson, Daniel E.	H. E. 13899, Roseburg 03884.	Crater.	160	Commissioner dismissed proceedings; appealed by Solicitor.
Wedekemper Henry W.	H. E. 11540, Roseburg 02204.	Siuslaw.	160	Commissioner held entry for cancellation; appealed by claimant.
Weisz, Charles.	H. E. 2898, Lakeview 0799.	Deschutes.	160	Commissioner held entry for cancellation.
Welch, John.	Homestead squatter, Seattle 0868.	Snoqualmie.	160	Adverse proceedings directed; proceedings held in abeyance, since lands are covered by selection of N. P. Ry.
Wheatman, Mary.	C. D. S., Seattle 02141.	Washington.	160	Adverse proceedings directed; hearing applied for.
Whities, George.	T. and S. 8550, La Grande 06881.	Umatilla.	160	Commissioner held entry for cancellation.
Wilson, Evelyn M.	H. E. 15157, La Grande 04890.	Minam.	160	Adverse proceedings directed.
Wilson, Frank D.	C. D., Seattle 0734.	Washington.	160	Hearing set; postponed indefinitely at request of claimant.
Wilson, John J.	H. E. 13139, Roseburg 03584.	Siuslaw.	160	Decision of R. and R. in favor of claimant.
Winters, Comfort B.	H. E., Olympia 0156.	Olympic.	160	Commissioner dismissed adverse proceedings; appeal by Solicitor.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Wood, Alberton	Arlington lode, M. S. 607, Roseburg 02960.	Umpqua	20	Adverse proceedings directed.
Wood, Lee	T. and S. 682, The Dalles 07109	Ochoco	160	Commissioner held application for rejection; appealed by claimant.
Woodruff, G. L., et al	Jumbo Association placer, M. S. 978, Seattle 02015.	Washington	160	Hearing set but postponed indefinitely at request of claimants.
Woodward, John	T. and S. 8563, La Grande 06866	Umatilla	160	Commissioner held entry for cancellation.
Young, Arthur J	Homestead squatter, Seattle 02087	Snoqualmie	160	Decision of R. and R. in favor of United States; appealed by claimant.
Abstract Coal Association	M. E. 02151, Seattle	Washington	560	Commissioner closed case, as no attempt was made to perfect title.
Acheson, Joseph	H. E. 01475, Roseburg	Siuslaw	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.
Adams, O	H. E. 06353, Roseburg	Crater	160	Canceled.
Alexander, John	H. E. 0928, Seattle	Snoqualmie	160	Closed by commissioner, as claimant had abandoned same.
Anderson, Mary (widow of Neils Anderson).	H. E. 0882, Portland	Siuslaw	40	Approved for patent by commissioner, upon proper payment under act Mar. 4, 1911.
Atkin, Henry	H. E. 01034, Portland	....do	160	Canceled.
Banister, P. W	H. E. 01086, Lakeview	Fremont	160	Do.
Barmore, H. E	H. E. 03047, Waterville	Chelan	160	Do.
Barnes, Elbridge S	H. E. 02282, Portland	Siuslaw	160	Do.
Barnett, Marcellus	C. D. S. 602, Vancouver	Rainier	160	Relinquished.
Bartley, Charles C	H. E. 03511, Roseburg	Umpqua	160	Canceled.
Bay, Minerva (heir of James E. Bay, deceased).	H. E. 01261, Roseburg	Siuslaw	40	Do.
Bell, Wm. A	M. E. 01508, North Yakima	Rainier	160	Relinquished.
Beloit, Eugene	H. E. 0100, Seattle	Washington	160	Adverse proceedings dismissed by commissioner.
Berwald, Monte W	M. E. 072, Vancouver	Rainier	160	Canceled.
Bicknell, Henry J	M. E. 03776, North Yakima	....do	160	Relinquished.
Billings, Ernest H	T. and S. 06407, Roseburg	Santiam	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.
Bishop, May	H. E. 03541, Roseburg	Crater	160	Canceled.
Bohemia Gold Mining Co	Boston Consolidated Group, M. A. 04564, Roseburg.	Umpqua	148	Do.
Boswell, J. E	Homestead squatter, Roseburg	Crater	160	Abandoned; no filing offered within 90 days after filing of plat.
Bowen, William C	H. E. 02295 Walla Walla	Wenaha	160	Canceled.
Breidenstein, J. W	Coal entry 01830, Seattle	Washington	100	Do.
Briggs, C. P	H. E. 06354, Roseburg	Crater	160	Homestead application rejected by commissioner.
Briggs, Leonard, deceased (Cyrus Briggs, heir).	H. E. 06355, Roseburg	....do	160	Decision of Secretary in favor of United States.

Brown, John N	H. E. 08033, The Dalles	Oregon	160	Canceled.
Brown, Louis A. (deceased)	H. E. 03045, North Yakima	Rainier	160	Canceled as result of a private contest.
Bryant, Milton O	H. E. 01337, Portland	Siuslaw	160	Patented.
Burns, Clarissa E	H. E. 01099, Seattle	Washington	160	Adverse proceedings dismissed by commissioner.
Bush, Albert E	H. E. 02072, Portland	Siuslaw	160	Do.
Bush, C. N	H. E. 0640, Seattle	Snoqualmie	160	Decision of Secretary in favor of United States; motion for review denied.
Calkins, Rose	H. E. 01368, Portland	Siuslaw	160	Canceled.
Caman, Anstie	H. E. 0931, Seattle	Snoqualmie	160	Closed by commissioner, as claimant had abandoned claim.
Carlin, David F	H. E. 0276, Burns	Malheur	160	Canceled.
Chambers, Andrew W	Coal entry 0889, North Yakima	Rainier	160	Relinquished.
Chambers, Elizabeth	Coal entry 01204, North Yakima	do	160	Decision of commissioner rejecting entry.
Cleman, John	Coal entry 0899, North Yakima	do	160	Relinquished.
Coppess, Stephan A	H. E. 02988, Waterville	Okanogan	160	Adverse proceedings dismissed by commissioner as result of stipulation entered into between Government and claimant.
Courtwright, J. L	C. D. S. 01512, Vancouver	Rainier	160	Relinquished.
Courtwright, J. Leslie	C. D. S. 01513, Vancouver	do	160	Do.
Courtwright, Margaret F	C. D. S. 01516, Vancouver	do	160	Do.
Cox, Robert F	H. E. 01578, Waterville	Chelan	160	Canceled.
Cusack, Dennis	H. E. 02262, Portland	Siuslaw	160	Final certificate authorized by commissioner under act Mar. 4, 1911.
Davis, Harriet B	T. and S. 05349, Roseburg	Siskiyou	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.
Dermott, W. E	H. E. 0862, Seattle	Snoqualmie	160	Decision of Secretary in favor of United States.
Detar, D. Franklin	H. E. 01113, Portland	Siuslaw	160	Canceled.
Dills, Isaac H	C. D. S. 0490, Olympia	Rainier	160	Relinquished.
Doubleday, Hiram	H. E. 05818, Roseburg	Crater	160	Adverse proceedings dismissed by commissioner.
Dougherty, James	H. E. 02095, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Druse, John L	Coal entry 01502, Seattle	Rainier	160	Relinquished.
Duefo, Charles	H. E. 03929, Waterville	Wenatchee	120	Decision of commissioner in favor of claimant.
Dunbar, Sarah J	T. and S. 02089, Roseburg	Umpqua	40	Entry rejected by commissioner.
Dupray, A	Homestead squatter, Roseburg	Crater	160	Abandoned; no filing offered within 90 days after filing of plat.
Edwards, Eugenie M	H. E. 0982, Waterville	Chelan	160	Patented.
Edwards, J. W	H. E. 0866, Seattle	Snoqualmie	160	Canceled.
Fay, Henry B	H. E. 03828, Vancouver		160	Claim found to be outside of National Forest.
Felton, William W	Coal entry 0890, North Yakima	Rainier	160	Relinquished.
Fendall, Florena	H. E. 03628, Roseburg	Siuslaw	160	Canceled.
Freeman, Dennis	H. E. 0753, Seattle	Olympic	160	Decision of Secretary in favor of claimant; approved for patent
French, B. E	H. E. 02076, Seattle	Snoqualmie	160	Decision of commissioner declaring claim invalid.
Forbes, D. Arthur	H. E. 01026, Portland	Siuslaw	160	Canceled.
Forbes, James V	H. E. 01027, Portland	do	160	Do.
Ford, Fred	H. E. 08034, Roseburg	Crater	160	Claim declared invalid by commissioner.
Fromm, Theron J	H. E. 05967, Roseburg		160	Claim found to be outside National Forest.
Garrison, Daniel	H. E. 03207, Roseburg	Umpqua	160	Forest Service recommended adverse proceedings be dismissed.
Gary, Paul	H. E. 05127, Roseburg	do	160	Final certificate issued.
Glass, Albert (deceased), (George and Sherman A., heirs).	H. E. 12607, The Dalles	Oregon	160	Canceled.
Godin, Samuel	H. E. 03882, Waterville	Wenatchee	160	Do.
Green, Preston W	H. E. 03075, Roseburg	Cascade	160	Favorable report submitted.
Griffiths, Austin E	Coal entry 01823, Seattle	Washington	160	Canceled in part by commissioner.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Haberly, Adolph	H. E. 10193, Roseburg	Umpqua	160	Decision of Secretary in favor of claimant; motion for review denied.
Haferkorn, Wm.	H. E. 02498, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Hall, Erastus K.	H. E. 04913, Roseburg	Crater	160	Decision of Secretary in favor of United States.
Hall, G. S.	H. E. 02330, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Hall, Wm. B.	H. E. 01025, Lakeview	Paulina	160	Canceled.
Hawk, A. L.	H. E. 02090, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Hayden, Jasper	H. E. 13158, Roseburg	Siuslaw	120	Canceled.
Haynes, Ray L.	H. E. 01284, Seattle	Olympic	160	Do.
Hemphill, Alberto	Coal entry 02662, North Yakima	Rainier	160	Relinquished.
Herold, H. G.	H. E. 0220, Olympia	do	160	Canceled.
Hildreth, S. C.	H. E. 0920, Seattle	Snoqualmie	160	Do.
Hill, Amelia E. (nee Brownson)	H. E. 03561, Roseburg	Umpqua	160	Do.
Hinton, Elva A.	C. D. S. 01807, Seattle	Washington	160	Closed on records of local land office for failure to make required payment.
Hinz, Paul	H. E. 01338, Portland	Siuslaw	160	Canceled.
Hofstra, Welke	H. E. 01066, Portland	do	160	Do.
Hooker, Elizabeth A.	Coal entry 0920, Seattle	Washington	160	Clear listed by commissioner on recommendation of Forest Service.
Hopkins, B. C.	H. E. 01012, Seattle	Snoqualmie	160	Decision of Secretary in favor of United States.
Hopkins, William F.	H. E. 01304, Portland	Siuslaw	160	Canceled.
Johnson, Harley I.	H. E. 02990, Roseburg	Crater	160	Do.
Johnson, O. L.	H. E. 02096, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Keller, Benjamin F.	H. E. 04170, La Grande	Wenaha	160	Final certificate issued.
Kent, Margeret L.	H. E. 01819, The Dalles	Oregon	160	Canceled.
Kingsbury, Chas.	H. E. 01457, Roseburg	Crater	160	Do.
Knobel, Agnes Zettl	H. E. 0631, Portland	Siuslaw	160	Decision of Secretary in favor of claimant.
La Chance, Dave	H. E. 02091, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Lamb, Elmer	H. E. 026, Roseburg	Siuslaw	160	Canceled.
Lamb, S. L.	Homestead squatter, Seattle	Snoqualmie	160	Forest Service recommended protest be withdrawn, which was done.
Lamb, S. L. (heir of Arthur Lamb, deceased).	H. E. 0865, Seattle	do	160	Decision of Secretary in favor of United States.
Larsen, Adelbert E.	Coal entry 0892, North Yakima	Rainier	160	Relinquished.
Lavin, Gust	H. E. 0339, Eureka	Siskiyou	160	Canceled.
Lazeron, Wm.	C. D. S. 607, Vancouver	Rainier	160	Relinquished.
Leonard, Mrs. Susan	H. E. 0227, Olympia	Snoqualmie	160	Decision of Secretary in favor of United States.
Logue, John S.	H. E. 0381, Seattle	Washington	160	Canceled.
Longley, Charles W.	H. E. 01854, Portland	Siuslaw	160	Approved for patent.
Longmire, David	C. D. S. 0891, North Yakima	Rainier	160	Relinquished.

Longmire, Elcaine	C. D. S. 01532, Vancouver	do	160	Do.
Longmire, Lizzie	C. D. S. 01515, Vancouver	do	160	Protest dismissed by commissioner on recommendation of Forest Service.
McCredy, Alex E	Coal entry 02665, North Yakima	do	160	Relinquished.
McDonald, Angus	H. E. 0232, Olympia	Olympic	160	Decision of commissioner in favor of claimant.
McDonald, Archie	H. E. 0752, Seattle	do	160	Decision of Secretary in favor of claimant.
McGill, Daniel	H. E. 0173, Portland	Siuslaw	160	Patented.
McGirr, Alberta	H. E. 15045, La Grande	Umatilla	160	Canceled.
McGraham, Charles	H. E. 01664, Portland	Oregon	160	Do.
McLaughlin, Millie	H. E. 01331, La Grande	Wallowa	160	Relinquished.
McLish, G. H	H. E. 02101, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Mahoney, Jennie	Homestead squatter, Roseburg	Crater	169	Abandoned; no filing offered within 90 days after filing of plat.
Marks, Harry P	H. E. 03969, Roseburg	Siuslaw	160	Canceled.
Marks, T. E	H. E. 0770, Seattle	Snoqualmie	160	Decision of Secretary in favor of United States.
Marrs, J. W	H. E. 02870, Portland	Oregon	160	Canceled.
Marschke, August	H. E. 02100, Seattle	Snoqualmie	160	Claim held invalid by commissioner.
Marsino, Victor	H. E. 02089, Seattle	do	160	Claim rejected by commissioner.
Merkel, Genevieve L	H. E. 03983, Spokane	Colville	160	Eliminated.
Miller, Alexander	C. D. S. 324, Olympia	Rainier	160	Relinquished.
Miller, John X	H. E. 01761, Roseburg	Crater	80	Decision of commissioner dismissing proceedings.
Monson, Carl M	H. E. 29650, Olympia	Rainier	160	Canceled.
Montgomery, Catherine	H. E. 0546, Seattle	Washington	160	Decision of Secretary in favor of claimant.
Morris, J. B	H. E. 01131, Portland	Siuslaw	160	Canceled.
Morrison, Frank B	H. E. 01294, Vancouver	Columbia	160	Decision of Secretary in favor of United States.
Moyers, Jos. D	H. E. 02259, La Grande	Umatilla	160	Canceled.
Neely, John W	H. E. 03646, Roseburg	Crater	160	Do.
Newton, Allen L	H. E. 0782, Seattle	Snoqualmie	160	Decision of Secretary in favor of United States.
Noah, Amanda	H. E. 05430, Portland	Siuslaw	160	Canceled.
Noonan, Coleman	T. and S. 05364, Roseburg	Crater	160	Adverse proceedings dismissed by commissioner.
Northern Pacific Railway Co	Forest lieu selection 0436, Waterville	Wenatchee	80	Land involved found to be within primary limits of grant to Northern Pacific Ry.; closed.
Obrist, Mary Dunning	H. E. 0319, Olympia	Olympic	80	Canceled.
O'Connor, C. H	H. E. 0370, Seattle	Snoqualmie	160	Decision of Secretary in favor of United States.
O'Connor, J. L	H. E. 0860, Seattle	do	160	Do.
Oregon Security Co	Bonita placer, M. S. 04574, Roseburg	Umpqua	150	Canceled.
Osse, Sophie	H. E. 03784, Roseburg	Crater	160	Do.
Ott, John	H. E. 02127, Seattle	Snoqualmie	160	Do.
Owens, Evan J	H. E. 0464, Portland	Siuslaw	160	Patented.
Parker, Fred	Coal entry 03871, North Yakima	Rainier	160	Relinquished.
Parker, Lois I	Coal entry, Vancouver	do	160	Entry rejected by commissioner.
Parsons, A. S	H. E. 02086, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Pennington, Mark	Coal entry 03779, North Yakima	Rainier	160	Relinquished.
Phelps, A. M	H. E. 01176, Portland	Oregon	160	Canceled.
Phelps, Ira F	H. E. 01175, Portland	do	160	Do.
Phelps, Ralph	H. E. 01169, Portland	do	160	Do.
Phoenix Mining Syndicate	M. S. 02009, Seattle	Snoqualmie	40	Canceled in part by commissioner; remainder patented.
Pichette, Theo	H. E. 01047, Seattle	do	160	Decision of Secretary in favor of United States.
Polson, Alexander	Coal entry 01714, Seattle	Washington	160	Closed on default of claimant to make proof and payment.
Pond, G. O	H. E. 02865, Roseburg	Crater	160	Canceled.
Potter, Edw	H. E. 01146, Seattle	Washington	160	Do.
Powles, J. E	H. E. 04250, Waterville	Wenatchee	160	Decision of commissioner closing case in favor of United States.
Proctor, John G	H. E. 10137, Waterville	Okanogan	80	Relinquished.

Cases involving claims to lands in the National Forests under homestead, timber and stone, mineral, desert-land, and other laws handled by the Solicitor during fiscal year 1912—Continued.

DISTRICT NO. 6—Continued.

Claimant.	Character of claim.	National Forest.	Quantity of land.	Status June 30, 1912.
			Acres.	
Prosser, J. V	H. E. 02083, Seattle	Snoqualmie	160	Canceled.
Rankin, George	C. D. S. 01510, Vancouver	Rainier	160	Relinquished.
Reich, Max	C. D. S. 073, Vancouver	....do	160	Closed by commissioner; failure to make proof.
Richard, Clare C	H. E. 03666, Roseburg	Siuslaw	160	Canceled.
Rigg, Harry B	Coal entry 01507, North Yakima	Rainier	160	Relinquished.
Robinson, John M	H. E. 03849, Roseburg	Siuslaw	160	Final certificate issued.
Roe, George W	H. E. 670, Juneau	Tongass	100	Solicitor informed Associate Forester that this department would interpose no objection to issuance of patent.
Rowe, Harry	Coal entry 03733, North Yakima	Rainier	160	Relinquished.
Russell, S. E	H. E. 0387, Waterville	Okanogan	160	Canceled.
Ryan, Loyal W	H. E. 02281, Roseburg	Siuslaw	160	Protest withdrawn by Forest Service.
Saindon, E. L	H. E. 02117, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Sanford, Elijah	C. D. S. 03829, North Yakima	Rainier	160	Relinquished.
Schalling, Edward	H. E. 03861, Roseburg	Siuslaw	160	Canceled.
Servis, W. E	H. E. 02097, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Shaw, Wallace S	H. E. 03755, The Dalles	Oregon	80	Canceled.
Shea, George E	H. E. 02085, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Sherbet, C. T	H. E. 03918, Roseburg	Siuslaw	160	Canceled.
Shields, Anna	C. D. S. 01985, Seattle	Washington	160	Do.
Sisco, W	H. E. 0929, Seattle	Snoqualmie	160	Closed by commissioner as claimant had abandoned same.
Smith, Mrs. McRae	C. D. S. 01672, Seattle	Washington	160	Closed by commissioner because claimant failed to perfect title.
Smith, N. J	H. E. 02092, Seattle	Snoqualmie	160	Claim declared invalid by commissioner.
Smith, Walter	H. E. 03738, La Grande	Wallowa	160	Canceled.
Snead, Vincent B	T. and S. 02892, Roseburg	Umpqua	160	Do.
Snyder, Ed	H. E. 01288, Juneau (Soldiers' additional).	Tongass	Not given.	Application rejected and case closed by commissioner.
Soeur, E. D	H. E. 01279, Seattle	Olympic	160	Canceled.
Spaulding, Elmer	H. E. 04020, Spokane	Colville	160	Relinquished.
Starr, George	H. E. 04012, Spokane	....do	160	Canceled.
Stauff, Chas. W	H. E. 03139, Roseburg	Siuslaw	160	Adverse proceedings dismissed by commissioner.
Summers, James M	H. E. 03578, Roseburg	....do	160	Canceled.
Taylor, Geo. E. (Clyde Lloyd and Hammond Lumber Co., transferees).	H. E. 01815, Roseburg	Umpqua	160	Claimant relinquished and executed quitclaim deed to land involved.
Templeton, Floyd C	H. E. 06383, Roseburg	Siuslaw	160	Adverse proceedings dismissed.
Thompson, J. M	M. E. 07070, Roseburg	Siskiyou	40	Case closed in favor of United States by commissioner.
Tingley, Algernon H	H. E. 03754, The Dalles	Oregon	80	Canceled.
Vogl, L. H	H. E. 08599, Seattle	Snoqualmie	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.

Walker, James L	H. E. 04074, La Grande	Weneha	160	Clear listed.
Watson, Edmund H	H. E. 04624, Roseburg	Crater	160	Adverse proceedings dismissed by commissioner.
Weikel, Ella C	C. D. S. 01534, Vancouver	Rainier	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.
West Coast Mines Co	M. S. 06428, Roseburg	Umpqua	64	Decision of commissioner declaring location invalid.
Wheeler, Elmer K	C. E. 03782, North Yakima	Rainier	160	Canceled.
Wheeler, Levant C	C. E. 03774, North Yakima	do	160	Relinquished.
Wheelock, Mary A	H. E. 9146, La Grande	Minam	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.
White, John H	H. E. 027, Olympia	Rainier	160	Canceled.
Whitson, Alexander B	C. E. 0883, North Yakima	do	160	Relinquished.
Whitson, Edward	C. E. 02662, North Yakima	do	160	Canceled.
Williams, Clayton J	H. E. 8302, Waterville	Wenatchee	160	Do.
Williams, James (heirs of)	H. E. 02050, Waterville	do	160	Relinquished by widow of entryman, which was protested by sister of entryman; Assistant Secretary affirmed action of commissioner in accepting relinquishment.
Wood, Linna B	T. and S. 07737, The Dalles	Deschutes	160	Canceled.
Woodward, George B	H. E. 878, Waterville	Colville	160	Do.
Woughter, Frank C	H. E. 04532, La Grande	Wenaha	160	Do.
Wright, Burke E	H. E. 03156, Roseburg	Siuslaw	160	Adverse proceedings dismissed by commissioner on recommendation of Forest Service.
Wright, David E	C. D. S. 01506, Vancouver	Rainier	160	Relinquished.
Yates, Frank J	H. E. 02651, Portland	Siuslaw	160	Canceled.

Grazing trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912.

CIVIL—ADMINISTRATIVE SETTLEMENT.

Trespasser.	National Forest.	District.	Kind and number of stock.	Value of forage consumed.	Status June 30, 1912.
Beaverhead Ranch Co	Madison	1	1,000 sheep	$25.00	Paid.
McAllister, Thomas	Custer	1	40 cattle	38.46	Do.
Johnston, J. L	Jefferson	1	4,700 sheep	91.02	Do.
Ludolph, G. C	Custer	1	222 cattle	133.20	Do.
Thex, Chas. H	do	1	140 cattle	43.26	Do.
Denver-Laramie Realty Co	Colorado	2	500 sheep	10.00	Do.
Greenough, Wm	Shoshone	2	30 cattle, 24 horses	9.00	Claim allowed by administrator of estate.
Pioneer Sheep Co	Hayden	2	2,100 sheep	5.25	Paid.
Souter, C. H	Washakie	2	1,238 sheep	27.85	Do.
Archuleta, Fidel	Jemez	3	1,800 sheep	13.50	Payment demanded.
Archuleta, J. M., jr	do	3	990 sheep	14.85	Do.
Black, G. W	Coconino	3	71 cattle	86.25	Paid.
Burns, T. D	Jamez	3	9,800 sheep	381.50	Do.
Bursum, H. O	Datil	3	2,000 sheep	5.00	Do.
Champion, R. D	Alamo	3	154 cattle, 4 horses	138.60	Do.
Champion & Neatherlin	do	3	315 cattle	322.50	Do.
Cordova, Reyes	Pecos	3	1,500 sheep and goats	45.00	Do.
de Araballo, Jesus	Coronado	3	123 cattle	21.39	Do.
Grigg & Son	Alamo	3	99 cattle	59.40	Do.
Hubbel, Frank A	Datil	3	1,274 sheep	3.19	Do.
Do	do	3	2,000 sheep	15.00	Do.
Lopez, J. M	Jemez	3	2,100 sheep	21.00	Do.
Luna, Solomon	Datil	3	7,365 sheep	73.65	Do.
McKeefry, Barney	do	3	1,780 sheep	57.85	Do.
Montoya, Clotario	Jemez	3	1,300 sheep	13.00	Do.
Morley, Wm. R	Datil	3	2,200 sheep	11.00	Do.
Neatherlin, E. L	Alamo	3	152 cattle	133.20	Do.
Newman, Geo. L	Prescott	3	700 sheep	17.00	Payment demanded.
Rees, Tom L	Coconino	3	2,000 sheep	5.00	Paid.
Schulze, Henry	Alamo	3	740 goats	24.20	$15 paid; case closed.
Scott, Geo	Sitgreaves	3	4,400 sheep	16.00	Paid.
Tafoya, J. C	Jemez	3	343 sheep	4.29	Do.
Trainor, Hugh	Apache	3	26 cattle	8.90	Do.
Trujillo, Eusebio	Pecos	3	1,330 sheep and goats	19.95	Do.
Vigil, Domingo	Jemez	3	1,500 sheep	7.50	Do.
Blessinger, Chas	Payette	4	350 sheep	8.80	Do.
Chipman, Squire	Pocatello	4	4,000 sheep	40.00	Do.
Heath, O. J	Toiyabe	4	2,500 sheep	2.60	Do.
Henderson, J. N	Sevier	4	479 sheep	28.74	Do.
Hopkins	do	4	840 sheep	4.20	Do.

Ingersoll, Robt. & M. H	Wasatch	4	1,500 sheep	13.75	Do.
Little, Andrew	Payette	4	1,300 sheep	19.50	Do.
Little, John	do	4	800 sheep	20.00	Do.
Loe, James	Weiser	4	2,250 sheep	46.20	Do.
Mackey, Wm	do	4	65 swine	6.00	Payment demanded.
Otto, Albert	do	4	4,100 sheep	20.00	Paid.
Parkinson, S. W	Cache	4	1,230 sheep	48.60	Payment demanded.
Perron, Wm	Payette	4	800 sheep	20.00	Paid.
Richardson, C. V	Weiser	4	2,000 sheep	30.00	Do.
Richardson & Hugues	Pocatello	4	1,100 sheep	60.50	Do.
Tangreen, Andrew	La Sal	4	53 cattle	2.65	Do.
Thorp & Co	Sawtooth	4		68.60	Do.
Wittington, Wm. D	Targhee	4	1,334 sheep	6.67	Do.
Arrien, J	Modoc	5	1,500 sheep	10.00	Do.
Brite, L. F	Kern	5	116 cattle	423.11	Do.
Duke, Walter D	Modoc	5	41 cattle	21.52	Do.
Espil, Martin	Mono	5	1,600 sheep	88.00	Do.
Fleming & Ward	Plumas	5	2,150 sheep	17.90	Do.
Garnier, E. M	do	5	1,000 sheep	10.00	Do.
Haugedorn, H. H	Shasta	5	300 sheep	75.59	Do.
Kern County Land Co	Kern	5	16 cattle	69.72	Do.
Norin & Chandler	Modoc	5	1,544 sheep	15.44	Do.
Parale, John	Mono	5	2,000 sheep	30.00	Do.
Pon Brothers	Plumas	5		28.30	Do.
Street, T. W	Sequoia	5	16 cattle, 9 horses, 93 hogs	24.20	Do.
Arrien, Rufino	Malheur	6	1,400 sheep	208.53	Do.
Blankenship Brothers	Wenaha	6	1,700 sheep	16.00	Payment demanded.
Wright, A. C	Whitman	6	1,014 sheep	87.30	Paid.

Grazing trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912—Continued.

CIVIL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Kind and number of stock.	Value of forage consumed.	Status June 30, 1912.
Thompson, Addie	Helena	1	Montana	1,000 sheep	$51.60	Referred to United States attorney.
Crosby, Joseph B	Big Horn	2	Wyoming	1,700 sheep	106.25	Pending.
Donnel, John A	Hayden	2	do	2,400 sheep	19.20	Paid.
Espinoza, O. D	Rio Grande	2	Colorado	62 cattle	48.05	Pending.
Gallegos, Eugenio	San Juan	2	do	2,300 sheep	46.00	Paid $46 actual and $50 exemplary damages.
Newcastle Land & Livestock Co.	Sundance	2	Wyoming	6,000 sheep	538.30	Judgment for $351.29.
Taylor, W. E	Big Horn	2	do	550 cattle	274.35	Pending.
Weisel Bros	San Juan	2	Colorado	700 goats	29.00	Paid.
Wirt, Gomez & Co	do	2	New Mexico	2,000 sheep	29.86	Pending.
Yellowstone Sheep Co	Washakie	2	Wyoming	1,000 sheep	70.00	Paid $75 actual and $25 punitive damages.
Burlison, Ed	Alamo	3	New Mexico	30 cattle	31.50	Judgment for $31.50 and costs $81.60, satisfied; injunction also granted.
Bursum, H. O	Datil	3	do	5,800 sheep	52.25	Referred to United States attorney.
Do	do	3	do	4,200 sheep	35.39	Do.
Espinosa, Juan	Crook	3	Arizona	35 cattle	73.50	Referred to Attorney General recommending suit for actual and punitive damages and injunction.
Gallegos, Juan A	Carson	3	New Mexico	1,100 sheep	55.00	Referred to United States attorney for recovery of actual and punitive damages.
Gomez, Manuel	Jemez	3	do	3,500 sheep	35.00	Do.
Hance, G. W., et al	Prescott	3	Arizona	150 cattle	375.00	Settled; defendants paying grazing fees $75, making application and paying fees for current year, and consenting to judgment for costs, $144.45.
Jones, J. W	Tonto	3	do	35 cattle	45.00	Judgment $45 actual, $100 punitive damages, $12.20 costs; not satisfied.
Joy, Elihu	Alamo	3	New Mexico	238 cattle and 33 horses	528.45	Judgment $528.25 and costs $322.70; satisfied; injunction also granted.
Joy, Eugene	do	3	do	25 cattle and 4 horses	26.00	Judgment for $26 actual and $10 punitive damages, $65 costs; not satisfied.
Lopez, Telesfor	Carson	3	do	65 cattle	48.75	Referred to United States attorney for recovery of actual and punitive damages.
Magby Bros	Alamo	3	do	400 sheep	24.00	Settled without suit by payment of $24 actual and $6 punitive damages.
Mills, J. J	do	3	do	30 cattle	27.00	Judgment for $27 and costs $64.64; not satisfied.
Montgomery, W. F	do	3	do	95 cattle	106.25	Judgment for $106.25 actual, $25 punitive damages, and $38.30 costs; satisfied.
Parker, John	do	3	do	743 goats	182.78	Complaint filed asking actual and punitive damages.
Do	do	3	do	20 cattle and 2 horses	70.50	Judgment for $70.50; not satisfied.
Parkinson, T. J	do	3	do	10 cattle	9.00	Referred to United States attorney.
Smith, Sam B	do	3	do	40 cattle	48.00	Judgment for $48 and costs $49; satisfied.

Spurgeon, Stephen F	Gila	3	do	150 cattle and 15 horses	247.50	Settled by payment of $247.50 actual and $50 punitive damages, and $50 costs.
Timin, J. H	Alamo	3	do	325 horses	48.75	Closed; trespasser financially irresponsible.
Van Winkle, J. W	do	3	do	530 goats	29.80	Complaint filed asking $29.80 actual and $50 punitive damages.
Varner, W. W	do	3	do	800 goats	22.00	Judgment for $22 actual, $25 punitive damages, and costs $1[illegible]; satisfied.
Wayne Bros	do	3	do	180 cattle and 70 horses	225.00	Closed; $53.50, amount of grazing fees, accepted in settlement.
Worthington, J. C	do	3	do	20 cattle	18.00	Judgment for $15 and costs $193.40; not satisfied.
Danield, David	Pocatello	4	Idaho	100 cattle	20.00	Complaint filed; pending.
Evans, L. L	do	4	do	75 cattle	15.00	Do.
Knowles, Harvey	Weiser	4	do	2,250 sheep	83.30	Do.
Preston, W. C	Wasatch	4	Utah	1,800 sheep	233.57	Do.
Meachum, F. C	Minidoka	4	do	500 sheep	7.50	Do.
Quickert, P. A	Fayette	4	Idaho	1,900 sheep	9.50	Do.
Black, John, jr	Powell	4	Utah	300 cattle	29.72	Complaint filed, pending acceptance of offer of settlement.
Wines, Ira D	Humboldt	4	Nevada	1,400 sheep	15.00	Complaint filed; pending.
Barker, C. W	Wasatch	4	Utah	1,500 sheep	26.25	Confession of judgment in sum of $26.25 actual damages, $50 punitive damages and costs; paid.
Hyde, Orson	Ashley	4	do	1,200 sheep	44.27	Paid; actual damages $44.27.
Lapray Bros	Pocatello	4	Idaho	1,200 sheep	6.00	Paid; actual damages $6, punitive damages $25 and costs; total amount approximately $61.50.
Picket, Oliver B	Minidoka	4	Utah	1,000 sheep	12.50	Paid; actual damages $12.50, punitive damages $50; total, $62.50.
Wadley Bros	Wasatch	4	do	1,254 sheep	56.43	Paid; actual damages $56.43; punitive damages $50, costs $27.45; total, $135.83.
Pulsipher, John	Dixie	4	do	31 cattle	62.33	Paid; actual damages $62.33, punitive damages $25, and costs $48.50; total, $135.83.
Mitchel, H. L	Weiser	4	Idaho	6,000 sheep	50.00	Paid; actual damages $50, costs $14; total, $64.
Hales, Roy	Pocatello	4	do	500 sheep	31.50	Paid; actual damages $31.50, punitive damages $25 and costs; total, $90.
Gary, O. M	Sawtooth	4	do	4,900 sheep	147.00	Paid; actual damages $147, punitive damages $100, costs $13; total, $260.
Fletcher, Wm. A	do	4	do	2,300 sheep	25.00	Paid; actual $25 and punitive $50 damages, costs $38; total, $113.20.
Koehler, F. A	Lassen	5	California (northern district).	2,610 sheep	87.45	Paid $87.45 actual and $50 punitive damages.
Adams, G. E	Umatilla	6	Oregon	1,797 sheep	98.88	Paid.
Blanc, Theophile	Wallowa	6	do	191 sheep	13.75	Paid $13.75 actual and $50 punitive damages.
Chewaukan Land & Cattle Co	Paulina	6	do	1,160 cattle	232.00	Paid.
Downward & Shaeffer	Wallowa	6	do	335 sheep	21.78	Pending.
Gaylord, F. A	do	6	do	5 horses	23.43	Do.
Gibbons Bros. & Loving	Chelan	6	Washington	704 sheep	34.46	Paid $34.46 actual, $29.88 punitive damages, and $139.18 costs.
Healey, H. B	Wallowa	6	Oregon	900 sheep	224.00	Pending.
King, H. W	Wenaha	6	Washington	521 sheep	10.00	Paid $10 actual, $5 punitive damages and $77.60 costs.
Ladd, W. K	do	6	do	17 horses, 40 cattle	93.67	Pending.
Steen, J. T	Wallowa	6	Oregon	40 cattle	124.80	Do.
Stephenson, Mary	Ochoco	6	do	12 cattle	11.68	Paid $11.68 actual and $13.32 punitive damages.
Tippett, W. P	Wallowa	6	do	800 sheep	64.00	Judgment for $64 actual and $25 punitive damages and costs approximately $100; not yet satisfied.

Grazing trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912—Continued.

CRIMINAL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Kind and number of stock.	Status June 30, 1912.
Nunez, Victor & Lial, Jose	Hayden	2	Wyoming	2,100 sheep	No true bill.
Araballo, Francisco	Coronado	3	Arizona	123 cattle	Referred to Attorney General; defendant arrested; preliminary hearing set for July 8, 1912.
Brown, C. H., and Boney, Duran.	Tonto	3	do	2,500 sheep	Indicted, pleaded guilty; Brown (owner) fined $200; Duran (herder) $25.
Fenter, G. W	Coronado	3	do	300 cattle	Indicted; pending.
Galvadon, J	Jemez	3	New Mexico	3,500 sheep	Referred to United States attorney.
Lopez, Hipolito	do	3	do	5,000 sheep	Do.
Lucero, Benceslado	do	3	do	1,300 sheep	Do.
Marques, Telesfor	Carson	3	do	1,100 sheep	Do.
Martinez, Marcos	Pecos	3	do	1,500 sheep and goats	Do.
Oberto, Barney, et al	Tonto	3	Arizona	4,000 sheep	Indicted; pleaded guilty; Oberto (owner) fined $200 and the 4 other (herders) $1 each.
Van Winkle, J. W	Alamo	3	New Mexico	1,000 goats	Pleaded guilty; fined $100 and costs, $35.20, and sentenced 3 months in jail (jail sentence suspended).
Anderton, Evans	Fishlake	4	Utah	800 sheep	Information filed.
Barker, C. W	Wasatch	4	do	1,500 sheep	Case dismissed in view of civil settlement.
Bostas, Geo	Pocatello	4	Idaho	17 cattle	Fined $25; paid.
Farrell & Hunt	Weiser	4	do	2,250 sheep	No true bill.
Farris, William	Cache	4	Utah	1,230 sheep	Indictment returned; pending.
Fletcher, Wm. A	Sawtooth	4	Idaho	2,300 sheep	Fined $50, costs $7.40; total, $57.40; paid.
Gary, C. M., Wilson, J. C., and Hendrick, C. R.	do	4	do	4,900 sheep	Case dismissed in view of civil settlement by O. M. Gary.
Johnson, Thomas	Wasatch	4	Utah	1,500 sheep	Dismissed in view of civil settlement by C. W. Barker, owner of sheep.
Lapray, Elmer	Pocatello	4	Idaho	1,200 sheep	Fined $25.
Mattson, Chancey	Cache	4	Utah	250 sheep	No true bill.
Mitchell, H. L	Weiser	4	Idaho	6,000 sheep	Fined $25, costs $5.90; total, $30.90; paid.
Monestaria, Louis	Pocatello	4	do	4,000 sheep	Indictment returned; pending.
Ramsey, Cecil D	Sawtooth	4	do	1,200 sheep	Fined $20; paid.
Ross, Alexander	Payette	4	do	1,300 sheep	Information filed.
Souvereta, Domingo	do	4	do	2,300 sheep	Do.
Wadley, R. F	Wasatch	4	Utah	700 sheep	Dismissed in view of civil settlement by Wadley Bros.
Grimaud, P., et al	Sierra	5	California	2,400 sheep	Pending trial.
Inda, A	do	5	do	2,400 sheep	Do.
McCarty, R. T	Stanislaus	5	do		Dismissed.
Gibbons Bros. & Loving	Chelan	6	Washington	704 sheep	Verdict of acquittal.
Jacobs & Purdy	Wallowa	6	Oregon	27 horses	Trespassers pleaded guilty; fined $100 and costs amounting to $90.85.
Ladd, W. K	Wenaha	6	Washington	17 horses, 40 cattle	Pending.

INJUNCTION—REPORTED TO THE ATTORNEY GENERAL.

Crosby, J. B.	Bighorn	2	Wyoming	Citation for contempt in violating injunction.	Pending.
Burlison, Ed	Alamo	3	New Mexico	Action to restrain grazing trespass.	Injunction granted.
Espinosa, Juan	Crook	3	Arizona	do	Referred to United States attorney.
Hance, G. W., et al.	Prescott	3	do	do	Settled; defendants paying grazing fees for past year and applying for permit.
Joy, Elihu	Alamo	3	New Mexico	do	Injunction granted.

Timber trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912.

CIVIL—ADMINISTRATIVE SETTLEMENT.

Trespasser.	National Forest.	District.	Estimated— Quantity.	Estimated— Value.	Status June 30, 1912.
Coe, Frank E	Medicine Bow	2	2,700,000 feet	$6,750.00	Pending determination of title by General Land Office.
Eastman, H	Harney	2	31,194 feet and 10 cords	135.07	Payment demanded.
Fosdick, W. L	San Isabel	2	3,098 feet	7.14	Do.
Allen, J. F	Florida	3	16,820 feet b. m	27.98	Paid.
Apodaca, Casimiro	Datil	3	1 cord wood	5.40	Wood seized and sold.
Burton, S. B	Ozark	3	50,000 feet b. m	62.50	Closed; trespasser financially irresponsible.
Carlton, L. C	do	3	7 cords stave bolts	21.00	Paid.
Chess & Wymond	do	3	21,059 feet b. m	78.97	Do.
De la O, Augustin	Jemez	3	825 linear feet	13.87	Awaiting sale of seized timber.
Denman, L. D	Ozark	3	2,599 feet b. m	9.09	Paid.
Early, John	Florida	3	3,040 feet b. m	11.40	Do.
Fenton, E. M	Jemez	3	768 linear feet house logs	15.36	Do.
Gavin, Antonio	Carson	3	13,750 feet b. m	48.00	Awaiting sale of seized timber.
Gonzales, Daniel	Datil	3	1 cord wood	2.50	Wood seized and sold.
Green, Geo. L	Ozark	3	17,900 feet b. m	71.60	Paid.
Gross Kelly & Co	Pecos	3	67,661 feet b. m	219.90	Do.
Hall, Leonard	Chiricahua	3	400 posts	12.50	Timber seized and sold.
Ireland, A. H	Jemez	3	2,235 feet b. m	5.92	Paid.
Lopez, Alvino	Datil	3	8 cords wood	20.00	Wood seized and sold.
Moon, Zenas	Ozark	3	3,258 feet b. m	11.40	Paid.
Ortiz, Marcos	Pecos	3	9,778 feet b. m	31.77	Do.
Ponce, A	Datil	3	7 cords wood	17.50	Wood seized and sold.
Rose, Berry A	Ozark	3	515 cedar posts	45.75	Paid.
Santa Barbara T. & P. Co	Jemez	3	2,742 feet b. m., 14 saplings	14.23	Payment demanded.
Sponseller, S. A	Sitgreaves	3	760 linear feet	15.20	Paid.
Stewart, C. R	Datil	3	400 feet b. m	5.00	Do.
Thompson, Henry	Apache	3	392 linear feet poles	7.84	Do.
White Mountain Lumber Co	do	3	1,000 feet b. m	15.50	Do.
H. D. Williams Cooperage Co	Ozark	3	48,040 feet b. m	84.07	Do.
Burrows, J. B	Sevier	4	49,160 feet	147.48	Do.
Barandum, Simon	Shasta	5	1 tree	4.10	Do.
Brown, Jake	Kern	5	7 trees	1.75	Payment demanded..
Cortner, Press	Sequoia	5	158,385 feet	340.15	Pending.
Davies Box & Lumber Co	Tahoe	5	323,000 feet	368.95	Payment demanded.
Eldorado Lumber Co	Eldorado	5	170,440 feet	196.00	Pending investigation.
Fandango Lumber Co	Modoc	5	37,720 feet	110.62	Payment demanded.
Forks of Salmon River Mining Co	Klamath	5	73,080 feet	84.04	Paid.
Golden Gate Mining Co	Mono	5	7,000 feet, 550 poles	241.28	Pending.

Great Western Power Co.	Plumas	5	40,614 feet	190.35	Paid.
Henderson, O. W.	Tahoe	5	2 cords	1.15	Do.
Jacobs & Gowling	do	5	3,775 cords	943.75	Do.
Kinsey-Gruss Mining Co.	Plumas	5	58,020 feet	466.99	Pending.
Knox, C. E.	Mono	5	357,190 feet	803.68	Paid.
McCloud River Lumber Co.	Shasta	5	616,370 feet	1,386.83	Pending.
Monumental Mines Co.	Siskiyou	5	269,738 feet, 1,000 cords	847.73	Transferred to District 6.
Oro Electric Corporation	Plumas	5	104,030 feet	70.39	Paid.
Lucas & Morrison	do	5		142.37	Pending.
Pacific Gas & Electric Co.	Eldorado	5	1,111,287 feet, 191.4 cords	1,388.03	Payment demanded.
Rieber, George	do	5	402,940 feet	463.38	Do.
Riffle, Chess	California	5	4,370 feet	11.20	Paid.
Sierra & San Francisco Power Co.	Stanislaus	5	6 cords	4.50	Do.
Skupin, Julius	Kern	5	10 cords	10.00	Pending.
Squires, David	California	5	23,600 feet	51.20	Paid.
Standard Electric Co.	Eldorado	5	1,111,287 feet; 191.4 cords	1,388.03	Do.
Truckee Lumber Co.	Tahoe	5	1,420,000 feet	1,515.00	Payment demanded.
Williams, F. J.	Plumas	5	2,500 feet	13.00	Paid.
Alaska Supply Co.	Tongass	6	286,540 feet	501.44	Do.
Lamb-Davis Lumber Co.	Wenatchee	6	89,810 feet	142.35	Payment demanded.
Leper, James L.	Colville	6		589.72	Do.

Timber trespass cases handled by the Solicitor during the fiscal year ended June 30, 1212—Contined.

CIVIL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Estimated—		Status June 30, 1912.
				Quantity.	Value.	
Bonners Ferry Lumber Co	Pen d'Oreille	1	Idaho	1,026,950 feet	$2,053.90	Paid.
Gorus, G. D	Bitterroot	1	Montana	55,970 feet	322.60	Verdict for United States, $232.84.
Herron, S. B. and J. E	Coeur d'Alene	1	Washington (eastern district).	10,610 pieces cedar lagging, 588 ricks of wood.	1,147.25	At issue.
Hope Lumber Co	Pen d'Oreille	1	Idaho	120,800 feet	1,208.00	Suit dismissed; defendant insolvent and dissolved.
King, John, & Campbell, W. C.	Madison	1	Montana	1,050 poles, 160 posts, 215 braces, 53 saplings.	288.37	Judgment for United States; execution returned nulla bona.
Lake Shore Gold Mining Co	do	1	do	43,242 feet, 53 cords	538.75	Referred to United States attorney.
Carbon Timber Co	Medicine Bos	2	Wyoming	14,530,000 feet	23,572.24	Settled by agreement to pay $23,572.24 and build $20,000 fire line; $15,000 paid.
Fleming Bros	Arapaho	2	Colorado	782,000 feet	1,978.37	Settled by payment of $309.95 and agreement to purchase timber left on area.
Major, Joseph O	Pike	2	do	19,600 feet	62.15	Pending.
Pearson, M. J	Arapaho	2	do	51,522 feet	173.66	Do.
Pearson, Nels	Black Hills	2	South Dakota	28 cords	44.50	Do.
Pennington, Arthur, Woodland Merc. Co., and Colorado Midland Railway Co.	Pike	2	Colorado	42,645 feet	560.77	Do.
Vance, T. H	Uncompahgre	2	do	235 green Engelman spruce poles and 64 green Douglas fir poles.	150.13	Deposit of $150; awaiting approval or rejection by the Attorney General.
Walker, R. T	Harney	2	South Dakota	93,000 feet	469.56	Action to replevy; timber released under bond pending determination of title to land.
Alamagordo Lumber Co	Alamo	3	New Mexico	5,123,210 feet	6,077.00	Pending before Solicitor of Treasury on proposed compromise for $4,000.
Flores, Esteban	Datil	3	do	7 cords wood	19.25	Referred to United States attorney.
McArthur Milling Co	Ozark	3	Arkansas (eastern)	88,000 feet	[1]1,065.60	Referred to Attorney General.
McKanzie, D. P	Florida	3	Florida (northern district).	42,310 feet	592.34	Referred to United States attorney.
McRae, J. H., & Barrett, R. A.	Alamo	3	New Mexico	74,380 feet	1,151.01	Complaint prepared; not yet filed.
Monroe, W. T	Ozark	3	Kansas	33,150 feet	191.27	Referred to United States attorney.
Ramsey Bros. Tie Co	do	3	Arkansas (eastern)	54,568 feet	110.00	Pending further investigation.
Romero, Margarito	Pecos	3	New Mexico	100,000 feet	100.00	Judgment $100 and costs $372.35; not satisfied.
Tuttle, C. W	Ozark	3	Arkansas (eastern)	1,715 ties	205.80	Closed; patent issued for trespasser.
Watson, A. C	Alamo	3	New Mexico	(No estimate)		Judgment for $300, interest and costs; not satisfied.
Pacific Land & Water Co	Minidoka	4	Utah		794.44	Paid.

Blue Channel Mining Co.	Tahoe	5	California	408 posts, 594 caps	106.06	Pending.
Bodie Railway & Lumber Co.	Mono	5	do	14,433,180 feet	18,018.20	Do.
Melville, H. F.	Monterey	5	do	9,000 feet, 30 cords	52.00	Do.
Pacific Gas & Electric Co.	Eldorado	5	do	360,525 feet; 546.6 cords	728.89	Pending in office of United States attorney.
Power, H. T.	Tahoe	5	do	452,660 feet	760.40	Pending adjustment; railroad grant mineral character.
Standard Lumber Co.	Stanislaus	5	do	218,160 feet	2,061.06	Pending action Interior Department on lieu selection.
Trinity Bonanza King Mining Co.	Shasta	5	do	55,290 feet	552.90	Claim filed in bankruptcy case.
Cannon, Tom	Chelan	6	Washington	110,100 feet	1,169.00	Verdict for defendant.
Holcomb & Prewitt and D. G. Estell.	Okanogan	6	do	223,109 feet	2,677.43	Judgment against claimant on default for the value of timber and $127.19 costs; not yet satisfied.
Kiefer, August	Colville	6	do	40 cords wood; 100 railroad ties; 6,890 feet timber.	48.95	Pending.
Monumental Mines Co.	Siskiyou	6	California	1,000 cords wood; 269,738 feet timber	847.73	Do.
Moran, William E.	Washington	6	Washington	320 cords shingle bolts	720.00	Do.

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[1] Two hundred and forty-three dollars received for sale of timber seized, leaving $882.60 due.

CRIMINAL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Status June 30, 1912.
Neal, J. H.	Leadville	2	Colorado	Indictment returned.
Pearson, Nels	Black Hills	2	South Dakota	Referred to United States attorney.
Cruz, Miguel	Colorado	3	Arizona	Indicted; pleaded guilty; sentenced to 20 days in jail.
Florez, Esteban	Datil	3	New Mexico	Referred to United States attorney.
Willmore, Benjamin	Minidoka	4	Utah	Do.

INJUNCTION—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Nature of case.	Status June 30, 1912.
Milwaukee Lumber Co.	Coeur d'Alene	1	Idaho	Action to enjoin cutting of timber on unclassified odd sections in N. P. grant.	Bill filed; in lieu of temporary injunction court allowed defendant to file bond of $20,000 to indemnify United States.
Parker, Peat	Pen d'Oreille	1	do	Action to enjoin cutting of timber on unsurveyed school sections.	Temporary injunction granted.
Shoshone and Stack-Gibbs Lumber Co's.	Coeur d'Alene	1	do	Action to enjoin cutting of timber	Bill filed; bond to indemnify United States filed; continued.
Evans, W. M.	Arapaho	2	Colorado	Action to enjoin cutting of timber on unperfected homestead.	Pending decision of General Land Office on status of entry.
Suttle, A. L. & G. H.	Routt	2	do	Citation for contempt in violation of injunction	Pending resurvey of land.

Fire trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912.

CIVIL—ADMINISTRATIVE SETTLEMENT.

Trespasser.	National Forest.	District.	Status June 30, 1912.
Denver & Rio Grande R. R. Co.	San Isabell	2	Pending action by the Interior Department on request for cooperation as to part of the timber on unreserved lands.
Green, John C.	Trinity	5	Damage, $12.68; paid.
Langworthy, R. D.	Sierra	5	Damage, $49; paid.
Martin, Barney and Meldon	Klamath	5	Damage, $48.50, and cost of fighting fire; paid.
Southern California Edison Co.	Kern	5	Damage, $223.57; paid.

CIVIL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Status June 30, 1912.
Clarke, John W.	Pend D'Oreille	1	Idaho	Complaint filed; damage, $59.75; answer filed.
Hamburg, John	Kaniksu	1	do	Complaint filed.
Padrick, W. D.	Nez Perce	1	do	Referred to United States attorney; defendant not found.
Baatz & Perry	Routt	2	Colorado	Referred to United States attorney; pending.
Chicago, Burlington & Quincy R. R. Co.	Black Hills and Harney.	2	South Dakota	Settled by payment of $25,000.
Do.	do	2	do	Referred to United States attorney; pending.
Colorado & Southern R. R. Co.	Gunnison and Leadville.	2	Colorado	Referred to United States attorney.
Crago and Kaufman	Black Hills	2	South Dakota	Do.
Denver, N. W. & P. R. R. Co.	Arapaho	2	Colorado	Complaint filed; pending.
La Sarre, J. G.	Sundance	2	Wyoming	Settled by payment of $116.10.
Henry, John	Palisade	4	Idaho	Damage, $243.93; paid.
Walston, Phillip	Weiser	4	do	Verdict for defendant.
Corvallis & Eastern R. R. Co.	Oregon	6	Oregon	Damages, $4,422.38; interest, $428.95; and $724.21 costs; paid.
Northern Pacific Ry. Co.	Snoqualmie	6	Washington (western district).	Damages, $4,000, and costs, $426.89; paid.

CRIMINAL—REPORTED TO THE ATTORNEY GENERAL.

Petty, A. C.	San Isabell	2	Colorado	Hearing before United States commissioner; discharged.
Povlovich, Louis, et al.	Black Hills	2	South Dakota	Convicted; each of 5 defendants fined $10 and costs, aggregating $87.07.
Edwards, Bob	Gila	3	New Mexico	Referred to United States attorney.
Kinnear, Anthony	Coconino	3	Arizona	Indicted; not yet apprehended.
Lawrence, James, jr.	Arkansas	3	Arkansas (western)	Indicted; defendant not located.

Ott, Andrew	Ozark	3	Arkansas (eastern)	Closed; unable to locate principal witness.
Pugh, W. T	Arkansas	3	Arkansas (western)	No true bill.
Sullivan, John	Ozark	3	Arkansas (eastern)	Do.
Ward, J. T	do	3	do	Indicted; pending.
Ross, Andrew, jr	Fillmore	4	Utah	Fined $5, and costs, $2.95.
Babcock, E. S	Cleveland	5	California	Indictment returned.
Cummins, T. R	Sierra	5	do	Do.
Deal, John E	Tahoe	5	do	Referred to United States attorney.
Jensen, H. P	Cleveland	5	do	Reported to Attorney General.
Poggi, Felippo	do	5	do	Indictment returned.
Putze, Edward	do	5	do	No indictment returned.
Salazar, Ignacio	do	5	do	Indictment returned.
Shamikawa, Otsu & Hase	do	5	do	No indictment returned.
Adams, Downing & King	Crater	6	Oregon	Defendants Adams and King plead guilty; were fined $10 and costs, amounting to $45; Downing died prior to date set for trial.
Allen, Henry, and Webb, S. E	Washington	6	Washington	Trespassers entered plea of nolo contendere and were fined $10 each.
Bailey, T., and Moore, Dol	Crater	6	Oregon	Defendants plead guilty and were fined $10 each and costs amounting to $45.
Filisiano, George, and Stevens, J. P	Olympic	6	Washington	Trespassers plead guilty and each sentenced to serve three months in county jail.
Olinghouse, Jack and Alex	Crater	6	Oregon	Indictments returned but trespassers not yet apprehended.
Smith, John	Ochoco	6	do	Grand jury refused to return indictment.
Steiger, Werner, and Helman, Andrew	Oregon	6	do	Trespassers plead guilty and were fined $10 each.
Seeley, Eberly R., et al	Crater	6	do	Pending.
Stevens, T. G., and Reeder, George	Washington	6	Washington	Stevens plead guilty, was fined $500 and costs amounting to $35.28; Reeder not yet apprehended.

CRIMINAL—PROSECUTED IN STATE COURTS.

Trespasser.	National Forest.	District.	State.	Status June 30, 1912.
Allen, James	Angeles	5	California	Pleaded guilty; $50 fine.
Baker, Charles	Cleveland	5	do	Pleaded guilty; fined $50; remitted.
Brown, A	Angeles	5	do	Dismissed.
Colton, S	Cleveland	5	do	Fined $70.
Davis, G. W	Klamath	5	do	Pending; not yet apprehended.
Densmore, C. S	Cleveland	5	do	$50 fine and 6 months; jail sentence suspended.
English, Ed	Shasta	5	do	Pleaded guilty; $25 fine.
Evans, J. N	Cleveland	5	do	$50 fine and 6 months; jail sentence suspended.
Hatfield, A	do	5	do	Pleaded guilty; placed on probation; $50 fine suspended.
Henderson, J. J	do	5	do	Fined $50; remitted.
Hetrick, Claude	do	5	do	$100 fine and 30 days.
Hacket, J	Angeles	5	do	$50 fine.
Headley, H. J	do	5	do	Do.
Hollingsworth, A	do	5	do	Do.
House, H	Cleveland	5	do	Do.
Litzow, J. W	do	5	do	$50 and 6 months; jail sentence suspended.
Lowery, E. L	Angeles	5	do	Dismissed.
Lusardi, F	Cleveland	5	do	Released; insufficient evidence.
Mentz, F. W	Stanislaus	5	do	Pleaded guilty; $50 fine.

Fire trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912—Continued.

CRIMINAL—PROSECUTED IN STATE COURTS—Continued.

Trespasser.	National Forest.	District.	Judicial district.	Status June 30, 1912.
McIntosh, D.	Cleveland	5	California	Pleaded guilty; placed on probation; $50 fine suspended.
Montrel, Manuel	do	5	do	Fined $50; $40 remitted.
Phillips, P. V.	Angeles	5	do	$50 fine.
Racknityer, Fred	Cleveland	5	do	Fined $10; refusing to fight fire.
Rimby, Charles	do	5	do	$50 fine and 6 months; jail sentence suspended.
Rogers, Guy	Klamath	5	do	$50 fine.
Sayre, John S.	California	5	do	$30 fine.
Sepulveda, Albert	do	5	do	Do.
Sherman, William	Angeles	5	do	$50 fine.
Snow, H.	Cleveland	5	do	Fined $10; refusing to fight fire.
Shoemaker	Shasta	5	do	Pleaded guilty; $25 fine.
Stoner, M. A.	Angeles	5	do	Refusing to comply with terms of burning permit; dismissed.
Tulley & Son, J. K.	Sierra	5	do	Pleaded guilty; $50 fine; remitted on good behavior.
Vaughn, Forest	Trinity	5	do	Remanded to juvenile court under bond.
Verdugo, Manuel	Cleveland	5	do	Fined $10; refusing to fight fire.
Webb, E. H.	do	5	do	Fined $10.
Wilson, T.	Angeles	5	do	Fined $50.
Dundas, R. V.	Cascade	6	Oregon	Fined $25.

Occupancy trespass cases handled by the Solicitor during the fiscal year ended June 30, 1912.

CIVIL—ADMINISTRATIVE SETTLEMENT.

Trespasser.	National Forest.	District.	Character of trespass.	Status, June 30, 1912.
Walsh, E. P	Harney	2	Inclosure of land without permit	Special-use permit applied for and issued.
Erickson, A. P	California	5	Illegal inclosure; damage $16.35	Payment demanded.
Hansen Bros	Plumas	5	Illegal inclosure; damage $39.20	Paid.
Rankin, W	do	5	Illegal inclosure; damage $36.45.	Do.

CIVIL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National Forest.	District.	Judicial district.	Character of trespass.	Status June 30, 1906.
Central Colorado Power Co	Holy Cross	2	Colorado	Construction of power plant and conduit without permit.	Complaint filed.
Eastern Colorado Power Co	Pike	2	do	do	Referred to United States attorney.
Goemmer & Goemmer	San Isabel	2	do	Procurement of patent to land illegally	Suit instituted.
Henrylyn Irrigation District et al.	Pike	2	do	Construction of tunnel without permit	Demurrer to complaint set for argument.
Major, Joseph O	do	2	do	Illegal inclosure of land	Referred to United States attorney.
Pahasa Mining Co	Harney	2	South Dakota	Use of mining claim for agricultural purposes.	Do.
Safe Investment Co	Black Hills	2	do	Procurement of patent to land illegally	Do.
Telluride Power Co	Montezuma	2	Colorado	Construction of conduit without permit.	Restraining order granted.
Walker, R. T	Harney	2	South Dakota	Claim of title adverse to United States.	Injunction granted as to lot 1.
Fourr, William	Chiricahua	3	Arizona	Illegal inclosure	Bill for injunction filed.
Mestas, Clemente	Pecos	3	New Mexico	Claim of title adverse to United States	Continuance to October term granted.
Beaver River Power Co	Fillmore	4	Utah	Construction of power plant and conduit without permit.	Referred to United States attorney.
Telluride Power Co	Cache	4	do	do	Do.
Do	Wasatch	4	do	do	Complaint filed; pending.
Utah Light & Railway Co	do	4	do	do	Referred to United States attorney.
Caldwell, C. J	Modoc	5	California (northern district).	Illegal maintenance of easement	Do.
Curtis, Collins & Holbrook et al.	Plumas	5	do	Procurement of patent to land illegally	97 suits filed; all pending on answer.
Grover, H. M	Eldorado	5	do	do	Answer filed; pending.
Harris, S. J	Sierra	5	California (southern district).	Occupancy of land adverse to United States.	Dismissed.
Hydro-Electric Co	Mono	5	California (northern district).	Construction of power plant and conduit without permit.	Pending final hearing on merits.

Occupancy trespass cases handled by the solicitor during the fiscal year ended June 30. 1912—Continued.

CIVIL—REPORTED TO THE ATTORNEY GENERAL—Continued.

Trespasser.	National forest.	District.	Judicial district.	Character of trespass.	Status, June 30, 1906.
Jenkins-Castaic Mining Co	Santa Barbara	5	California (southern district).	Occupancy of land adverse to United States.	Pending on defendant's demurrer.
Linton, Henry	Klamath	5	California (northern district).	do	Do.
Martinez, A	Monterey	5	California (southern district).	Procurement of patent to land illegally	Pending on exceptions to report of master.
Nevada-California Power Co	Inyo	5	do	Construction of power plant and conduit without permit.	Reported to United States attorney.
Pacific Gas & Electric Co	Eldorado	5	California (northern district).	do	Pending agreed statement of facts.
Pine Valley Land & Water Co.	Cleveland	5	California (southern district).	Illegal maintenance of easement	Complaint filed.
Simpson, G. E	California	5	California (northern district).	Procurement of patent to land illegally	Pending hearing before master.
Siskiyou Electric Power Co	Klamath	5	do	Occupancy of land adverse to United States.	Settled; permit applied for.
Urtassun, M. and E	Santa Barbara	5	California (southern district).	do	Pending on defendant's demurrer.
Baird, E. C	Washington	6	Washington (western district).	Procurement of patent to land illegally	Awaiting decision of court on testimony submitted.
Big Bottom Telephone Co	Rainier	6	do	Construction of telephone line without permit.	Referred to United States attorney.

CRIMINAL—REPORTED TO THE ATTORNEY GENERAL.

Trespasser.	National forest.	District.	Judicial district.	Character of trespass.	Status, June 30, 1906.
Danke, Fred, and Reed, George.	St. Joe	1	Idaho	Maintenance of saloon on unperfected mining claim.	Danke pleaded guilty, fined $150, sentenced 60 days in jail; Reed convicted, sentenced 60 days in jail.
Robinson, George	Superior	1	Minnesota	Willful injury to telephone line	Arrested; bound over to grand jury under $500 bail.
Fourr, William	Chiricahua	3	Arizona	Illegal inclosure	Acquitted.
Revello, John	Prescott	3	do	Maintenance of saloon on unperfected mining claim.	Convicted; fined $50.
Gum, H. S	Sevier	4	Utah	Illegal inclosure	Bound over to grand jury under $250 bail.
Saloon cases	Humboldt	4	Nevada	Maintenance of saloons on unperfected mining claim.	Land eliminated from forest pending trial of cases.
LaMotte, W. L	Okanogan	6	Washington (western district).	Construction of flume without permit	Pleaded guilty; fined $10 and costs, amounting to $362.21.

General litigation handled by the Solicitor during the fiscal year ended June 30, 1912.

Title.	National Forest.	District.	Judicial district.	Character of case.	Status June 30, 1912.
U. S. *v.* Bishop	Coeur d'Alene	1	Idaho	Attempting to bribe a Forest officer to return false report on homestead.	Defendant not yet apprehended.
U. S. *v.* Cleary	do	1	do	Perjury	Demurrer to indictment argued.
U. S. *v.* Kulp	do	1	do	do	Do.
U. S. *v.* Lawrence	Pend Oreille	1	do	Embezzlement	Defendant not yet apprehended.
U. S. *v.* Nelson	Coeur d'Alene	1	do	Perjury	Demurrer to indictment argued.
U. S. *v.* Phillips	Kootenai	1	Montana	Forging indorsement on Government check	Entered plea of guilty and was sentenced to pay a fine of $100 and serve 90 days in jail.
Water right	Arapaho	2	Colorado	Adjudication of water right	Government's claim dating from Aug. 10, 1897, for water to irrigate Horseshoe ranger station approved by the court.
U. S. *v.* Aikine	Gunnison	2	do	Proceedings to revoke United States mineral surveyor's commission.	Aikine resigned; case closed.
Brodie *v.* Berryman	Black Hills	2	South Dakota	Suit by James Brodie to recover timber cut by Berryman from mining location claimed by Brodie, sale having been made to Berryman by Forest Service.	United States attorney authorized to represent Berryman; case abated by Brodie's death; administrator states case will not be revived.
Blume *v.* Western Box & Lumber Co.	Arapaho	2	Colorado, State court	Action in State court to prevent interference with fences placed across Caribou road.	Department of Justice authorized United States attorney to appear and protect United States interests.
U. S. *v.* Caylor	Pike	2	Colorado	Destruction of Forest Service notices	Grand jury failed to indict.
U. S. *v.* Central Colorado Power Co.	Holy Cross, Leadville, Pike, and Sopris.	2	do	Action to collect charges due under terms of stipulation; $1,850.	Referred to Department of Justice; pending.
U. S. *v.* Hasselstrom et al.	Harney	2		Involving title to homestead entries in Harney National Forest, lieu selections having been made therefor.	Referred to Commissioner of General Land Office.
U. S. *v.* King	Black Hills	2	South Dakota	Forgery of Government check	Referred to Department of Justice; pending.
Leroy & Wilson *v.* Swanson	Pike	2	County court, Clear Creek County, Colo.	Ejectment	Suggestions filed by United States attorney; court found for defendant, that special-use permit was in full force and effect and gave defendant superior right to occupy the surface of his premises.
U. S. *v.* Patton	Harney	2	South Dakota	Use of mails in scheme to defraud United States	Indictment returned.
U. S. *v.* Rishor	Black Hills	2	do	Intercepting mail	Verdict of not guilty.
Do	do	2	do	Forgery of Government check	Indicted.
U. S. *v.* Telluride Power Co.	Montezuma	2	Colorado	Damage to Government property by breaking of company's dam.	Referred to Department of Justice; complaint drawn; pending.
U. S. *v.* Wagon Wheel Gap Improvement Co.	Rio Grande	2	do	Action to restrain company from closing Goose Creek road.	At issue.
Stone, Eugene M. (personnel).	Uncompahgre	2	do	Conspiracy to intimidate Forest officer	Referred to Department of Justice; pending.

General litigation handled by the Solicitor during the fiscal year ended June 30, 1912—Continued.

Title.	National Forest.	District.	Judicial district.	Character of case.	Status June 30, 1912.
U. S. *v.* Moore	Sundance	2	Circuit court, Crook County, Wyo.	Dynamiting fish within National Forest	Verdict of not guilty.
U. S. *v.* Riley, Yokum & Ellison.	Routt	2	District court, Wyoming.	.....do	Riley sentenced to 1 to 2 years in State reformatory; Ellison 8 to 15 months in penitentitary; Yokum not guilty.
U. S. *v.* Brashears	Ozark	3	Western Arkansas	Making and presenting false claims against the United States.	Acquitted.
New Mexico *v.* J. J. Jones and C. A. Hodges.	Datil	3	New Mexico	Forest officers indicted for murder; killing occurred in enforcement of State stock laws.	Released on habeas corpus; closed on failure of Territory to perfect appeal.
Arizona *v.* F. L. Kirby	Crook	3	Arizona	Ranger arrested for murder; killing in self-defense in performance of official duties.	Released on preliminary hearing before committing magistrate.
New Mexico *v.* A. M. Neal et al.	Alamo	3	New Mexico	Forest officers removed trespassing cattle from accustomed range.	Demurrer to indictment sustained; closed on failure of Territory to perfect appeal.
U. S. *v.* Allen et al	Arkansas	3	Arkansas (eastern)	Suit to cancel patent	Answer filed; testimony to be taken in July, 1912.
U. S. *v.* Harmon	Ozark	3	.....do	.....do	Do.
U. S. *v.* Dalton & Lamson	Sevier	4	Utah	Throwing down fence around ranger station	Fine, $17.50; paid.
U. S. *v.* Lowe Bros	Weiser	4	Idaho	Breach of contract to purchase timber; damages $700.	Complaint filed; pending.
U. S. *v.* California N. E. Ry. Co.	Shasta	5	California (southern district).	Taking and carrying away gravel; damages $99.72.	Paid.
U. S. *v.* Davis-Field Lumber Co.	.....do	5	.....do	Breach of contract to purchase timber; damages $600.	Defendant insolvent; surety company liable on default of principal.
Fahey *v.* Ayres	Stanislaus	5	California (northern district).	Suit to restrain supervisor from collecting grazing fees.	Pending removal to United States district court.
Re Bingham, C. J		6		Application for patent for folding plow	Pending.
Re Knapp		6		Application for patent for portable creosote heater to be used in treatment of timber.	Do.
U. S. *v.* Coulishaw et al	Oregon	6	Oregon	Suit to determine title to school section embraced in National Forest prior to survey.	Submitted to court on argument.
U. S. *v.* Le Motte	Okanogan	6	Washington (eastern).	Injunction to restrain use of water on Alder Creek ranger station.	Service of injunction made; pending.
U. S. *v.* Lapham	Fremont	6	Oregon	Suit to forfeit reservoir site	Referred to United States attorney.
U. S. *v.* Little Deschutes Irrigation Co.	.....do	6	.....do	.....do	Do.
U. S. *v.* Tuley		6	.....do	Larceny of Government property	Pleaded guilty; sentence suspended.

REPORT OF THE APPOINTMENT CLERK.

United States Department of Agriculture,
Office of the Appointment Clerk,
Washington, D. C., September 19, 1912.

Sir: I have the honor to submit my annual report, together with certain statistical information concerning the personnel of the United States Department of Agriculture, as shown by the records of this office as they appeared on July 1, 1912.

Very respectfully,

R. W. Roberts,
Appointment Clerk.

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTION.

As a consequence of the adoption by this department of the "district system" established by the Civil Service Commission, having for its object the facilitation of the civil service work pertaining to the Government service outside of Washington, whereby certifications, etc., for certain field positions are issued by district secretaries representing that commission at the 12 district headquarters into which the United States has been divided, the Secretary of Agriculture, on January 25, 1912, approved regulations governing appointments, etc., in the field service, as adopted between the commission and the department, for the guidance of the field officials of the various bureaus, offices, and divisions of the department in making selections for appointments, etc., to the field positions which are embraced in the district system. The brief period during which the operation of this system has been in force has shown that this branch of the work has been to a great extent benefited, and it is expected that with further experience and familiarity in handling the work under the new regulations increased advantage will be derived from the application of the district system to the field work of the department.

Referring to the recommendations of the Departmental Committee on Efficiency and Economy in regard to the method of making appointments and other changes affecting the personnel in this department, I desire to report that the adoption of the "blanket and notification" system, inaugurated August 1, 1911, as distinguished from the "individual appointment" system, which had previously been in effect, has resulted in a decided improvement in the conduct of the work of this office. Considerable time has been saved to the Secretary and Assistant Secretary which was heretofore necessary for the signature of individual commissions of appointment, etc., and a uniform, economical, and expeditious system of handling this branch of the work has been thereby effected.

During the past few months a radical change has been made in the filing system of the office of the appointment clerk, requiring temporary additional clerical assistance. The records of this office had, since its first establishment, been filed chronologically, in document files. They have now been assembled and arranged so that the personnel papers of each employee of the department are placed in one flat letter-sized file, and are instantly obtainable and easily perused. New steel file cases have also been installed, which expedite reference to, and insure the safety and sanitary condition of, the records of the office.

The tables giving the distribution of employees by age and also the compensation table are given only in aggregate form, further analysis being considered inadvisable in the scope of this report, as such data would be of value only when considered in connection with similar information covering the entire Government service.

STATISTICAL INFORMATION.

Changes in the United States Department of Agriculture during the fiscal year 1911–12.

[From monthly reports to the Civil Service Commission.]

CLASSIFIED SERVICE.

Appointments for a probationary period of 6 months	1,361
Reinstatements in the service	84
Transfers within the department	366
Transfers from other departments of the Government to this department	52
Promotions in salary	1,943
Reductions in salary	60
Temporary or emergency appointments for periods of 6 months or less	814
Declination of and failures to accept appointment	101
Resignations	666
Appointments terminated	228
Removals from the service on account of misconduct, etc	50
Deaths	33
Temporary appointees whose services were terminated	527

CLASSIFIED SERVICE—POSITIONS EXCEPTED FROM EXAMINATION.

Appointments for temporary periods	2,952
Promotions in salary	211
Reductions in salary	80
Transfers made within the department	79
Separations from the service (through removal, resignation, or death)	37
Appointments terminated	2,052

UNCLASSIFIED SERVICE.

Appointments in the District of Columbia	40
Promotions in salary in the District of Columbia	72
Reductions in salary in the District of Columbia	3
Separations from the service in the District of Columbia	32
Appointments outside of Washington, D. C	193
Promotions in salary outside of Washington, D. C	31
Reductions in salary outside of Washington, D. C	0

Separations from the service outside of Washington, D. C	177
Temporary employments, for periods of 6 months or less, in the forests and fields and on stations in the various States outside of Washington, D. C	32,975
Temporary or emergency appointments in the District of Columbia	117
Separations of temporary or emergency appointees in the District of Columbia	110
Miscellaneous changes (not covered by any of the above classes)	146
Total number of changes reported	45,932

Males and females employed in the various bureaus, offices, divisions, and the Forest Service, in the United States Department of Agriculture, in and out of Washington, D. C., on July 1, 1912.

Bureau, division, office, etc.	In Washington.			Out of Washington.			Total.
	Males.	Females.	Total.	Males.	Females.	Total.	
Office of the Secretary	214	32	246	12		12	258
Weather Bureau	177	82	259	1,570	222	1,792	2,051
Bureau of Animal Industry	209	52	261	3,037	13	3,050	3,311
Bureau of Plant Industry	477	202	679	1,281	168	1,449	2,128
Forest Service	157	138	295	3,644	188	3,832	4,127
Bureau of Chemistry	202	51	253	259	34	293	546
Bureau of Soils	116	11	127	32		32	159
Bureau of Entomology	54	27	81	256	2	258	339
Bureau of Biological Survey	35	9	44	53		53	97
Division of Publications	91	97	188				188
Bureau of Statistics	53	48	101	60	1	61	162
Office of Experiment Stations	57	43	100	107	2	109	209
Library	5	24	29				29
Office of Public Roads	55	15	70	91	2	93	163
Division of Accounts and Disbursements	50	11	61	5		5	66
Insecticide Board	20	1	21	4		4	25
Total	1,972	843	2,815	10,411	632	11,043	13,858

NOTE.—The above table does not include temporary "field" employees.

Officers and employees of the department on statutory rolls and those paid from lump-sum funds, July 1, 1912.

Bureau, division, office, etc.	On statutory rolls.	On lump-sum funds.	Total.
Office of the Secretary	232	26	258
Weather Bureau	353	1,698	2,051
Bureau of Animal Industry	341	2,970	3,311
Bureau of Plant Industry	344	1,784	2,128
Forest Service	1,892	2,235	4,127
Bureau of Chemistry	217	329	546
Bureau of Soils	38	121	159
Bureau of Entomology	53	286	339
Bureau of Biological Survey	18	79	97
Division of Accounts and Disbursements	66		66
Division of Publications	188		188
Bureau of Statistics	91	71	162
Office of Experiment Stations	50	159	209
Library	24	5	29
Office of Public Roads	31	132	163
Insecticide Board		25	25
Total	3,938	9,920	13,858

Distribution, by States whence appointed, of employees of the United States Department of Agriculture, July 1, 1912.

State.	Branch of the department.															
	Office of Secretary.	Weather Bureau.	Bureau of Animal Industry.	Bureau of Plant Industry	Forest Service.	Bureau of Chemistry.	Bureau of Soils.	Bureau of Entomology.	Bureau of Biological Survey.	Division of Accounts and Disbursements.	Division of Publications.	Bureau of Statistics.	Office of Experiment Stations.	Library.	Insecticide Board.	Office of Public Roads.
Alabama	3	33	9	110	7	2	8	....	1	1	1	2	1	....	....	3
Arizona	....	21	1	4	143	1	2	....	3	1	....	1	1	....	....	1
Arkansas	....	28	25	74	25	2	3	....	....	1	2	2	....	....	....	2
California	....	107	38	43	641	17	1	13	7	1	2	1	14	....	....	5
Colorado	1	62	27	11	373	4	....	8	9	....	1	1	6	1	1	1
Connecticut	2	11	19	9	44	19	1	....	2	....	2	1	4	1	....	5
Delaware	2	3	6	6	......	2	....	....	....	....	1	2	....	....	....	1
District of Columbia	114	53	63	197	80	52	22	29	6	5	33	17	22	6	4	17
Florida	1	34	2	50	9	3	....	2	6	1	2	1	4	....	1	1
Georgia	5	54	14	97	12	10	3	1	....	1	....	4	1	....	....	2
Idaho	1	30	4	9	376	3	....	1	1	....	1	2	4	....	....	1
Illinois	2	57	470	38	39	32	6	3	1	5	9	10	8	2	2	2
Indiana	3	50	189	17	35	12	4	3	1	....	3	....	5	....	....	5
Iowa	6	59	185	36	42	8	4	1	2	3	13	6	12	1	1	5
Kansas	....	41	274	35	28	9	1	4	2	2	4	5	5	1	....	3
Kentucky	3	35	30	17	8	12	1	3	....	2	5	2	4	1	1	1
Louisiana	2	35	11	80	1	4	....	4	1	1	5	4	1	....	....	2
Maine	2	21	17	12	12	2	....	1	....	....	....	1	1	....	....	3
Maryland	13	30	120	81	32	17	7	13	3	4	11	7	4	3	....	3
Massachusetts	5	48	179	24	50	36	6	73	4	5	3	5	7	2	2	10
Michigan	6	98	39	31	69	17	5	3	3	5	4	5	3	2	....	4
Minnesota	3	32	55	21	68	4	2	2	2	1	1	3	4	2	1	1
Mississippi	2	38	12	100	3	1	3	1	2	....	2	3	1	....	....	2
Missouri	5	48	360	37	20	13	9	4	....	1	5	4	6	....	....	1
Montana	1	41	2	14	473	1	....	7	....	....	1	2	9	....	....	3
Nebraska	3	28	130	26	43	7	1	3	2	....	1	7	7	....	....	1
Nevada	...	8	......	10	28	1	1	1	....	....	....	....	1	....	....	....
New Hampshire	....	13	7	5	12	7	2	71	1	....	1	3	1	....	....	....
New Jersey	3	26	34	11	15	12	1	2	1	1	1	1	4	....	1	7
New York	13	116	254	66	66	64	11	15	10	4	12	11	8	2	1	13
New Mexico	....	24	10	6	174	1	....	....	....	....	....	1	3	....	....	1
North Carolina	1	51	14	83	23	7	12	1	1	....	5	3	1	....	1	4
North Dakota	1	18	7	19	5	3	....	2	4	....	....	1	1	....	....	....
Ohio	6	96	250	38	29	26	11	9	....	3	6	5	3	....	1	11
Oklahoma	....	21	32	70	21	5	....	1	1	....	2	2	....	....	....	2
Oregon	....	80	8	13	293	4	....	4	5	....	....	1	3	1	....	2
Pennsylvania	13	69	146	38	70	51	12	10	1	6	9	7	4	....	2	8
Rhode Island	1	11	11	1	1	3	2	1	....	1	1	1	....	....	....	4
South Carolina	3	41	19	97	6	6	4	4	....	2	4	5	4	....	1	3
South Dakota	....	31	11	29	49	7	....	1	....	....	1	1	1	....	....	2
Tennessee	....	44	12	34	17	7	1	4	....	2	2	4	2	1	....	6
Texas	2	94	57	185	14	3	....	5	....	....	3	3	3	....	....	2
Utah	1	6	16	10	155	1	1	1	....	1	....	1	7	....	1	1
Virginia	20	52	27	157	27	21	2	15	2	3	13	6	4	1	3	4
Vermont	1	10	17	18	7	5	....	....	1	1	1	2	1	1	....	1
Washington	....	56	14	21	293	5	2	2	6	....	4	1	4	....	....	2
West Virginia	4	19	13	9	8	....	....	4	1	....	3	1	....	1	....	1
Wisconsin	4	36	64	17	59	11	7	1	1	2	8	3	7	....	1	2
Wyoming	....	12	4	5	117	1	....	....	2	....	....	1	7	....	....	1
Alaska	....	8	......	......	4	....	....	....	....	....	....	....	....	....	....	....
Porto Rico	....	1	......	1	......	2	....	....	....	....	....	....	2	....	....	....
Hawaii	....	......	1	1	1	2	1	....	2	....	....	....	3	....	....	....
Algeria	....	......	......	1	......	....	....	....	....	....	....	....	....	....	....	....
Palestine	....	......	......	1	......	....	....	....	....	....	....	....	....	....	....	....
Chile	....	......	......	1	......	....	....	....	....	....	....	....	....	....	....	....
West Indies	....	7	......	......	......	....	....	....	....	....	....	....	....	....	....	....
Canada	....	......	2	......	......	....	....	4	....	....	....	....	....	....	....	....
Alien	....	4	......	2	......	1	....	2	....	....	....	....	1	....	....	1
Total	258	2,051	3,311	2,128	4,127	546	159	339	97	66	188	162	209	29	25	163

Total distribution, by States whence appointed, of employees of the United States Department of Agriculture, July 1, 1912.

State.	Total.	State.	Total.
Alabama	181	New Jersey	120
Arizona	179	New York	666
Arkansas	164	New Mexico	220
California	890	North Carolina	207
Colorado	506	North Dakota	61
Connecticut	120	Ohio	494
Delaware	23	Oklahoma	157
District of Columbia	720	Oregon	414
Florida	117	Pennsylvania	446
Georgia	204	Rhode Island	38
Idaho	433	South Carolina	199
Illinois	686	South Dakota	133
Indiana	327	Tennessee	136
Iowa	384	Texas	371
Kansas	414	Utah	202
Kentucky	125	Virginia	357
Louisiana	151	Vermont	66
Maine	72	Washington	410
Maryland	348	West Virginia	64
Massachusetts	459	Wisconsin	223
Michigan	294	Wyoming	150
Minnesota	202	Alaska	12
Mississippi	170	Hawaii	11
Missouri	513	Porto Rico	6
Montana	554	Alien	27
Nebraska	259		
Nevada	50	Total	13,858
New Hampshire	123		

Officers and employees in the various bureaus, offices, divisions, and the Forest Service, and their classification.

Bureau, division, office, etc.	Competitive.	Excepted.							Total.
		Experts.	Agents.	Collaborators.	Student assistants.	Forest guards.	Scouts.	Unclassified.	
Office of the Secretary	205	......	1	......	......	......	......	52	[1] 258
Weather Bureau	786	1	5	[2] 1,240	3	......	......	16	2,051
Bureau of Animal Industry	3,077	17	106	14	......	......	......	97	3,311
Bureau of Plant Industry	703	43	517	617	33	......	......	215	2,128
Forest Service	2,802	17	7	12	......	1,171	......	118	4,127
Bureau of Chemistry	436	23	18	40	1	......	......	28	546
Bureau of Soils	125	2	5	23	......	......	......	4	159
Bureau of Entomology	142	41	42	14	3	......	83	14	339
Bureau of Biological Survey	45	4	15	......	3	......	......	30	97
Division of Publications	177	......	......	......	......	......	......	11	188
Bureau of Statistics	90	......	67	......	......	......	......	5	162
Office of Experiment Stations	159	10	20	11	......	......	......	9	209
Library	28	......	......	......	......	......	......	1	29
Office of Public Roads	92	2	5	58	2	......	......	4	163
Division of Accounts and Disbursements	66	......	......	......	......	......	......	......	66
Insecticide Board	22	1	1	......	......	......	......	1	25
Total	8,955	161	809	2,029	45	1,171	83	605	13,858

[1] Includes the following appointments: Secretary and Assistant Secretary (presidential), and 2 private secretaries.
[2] Includes special river observers, special cotton-region observers, special meteorological observers, etc.

Employees of the various bureaus, divisions, and offices of the United States Department of Agriculture classified by rate of compensation, July 1, 1912.

Bureau, division, office, etc.	Rate of compensation.														
	Less than $480.	$480 to $600.	$600 to $720.	$720 to $840.	$840 to $900.	$900 to $1,000.	$1,000 to $1,100.	$1,100 to $1,200.	$1,200 to $1,400.	$1,400 to $1,600.	$1,600 to $1,800.	$1,800 to $2,000.	$2,000 to $2,250.	$2,250 to $2,500.	$2,500 and over.
Office of the Secretary	11	20	24	71	13	17	22	6	25	9	11	10	11	1	7
Weather Bureau	[1]1,287	86	35	61	96	10	140	1	151	69	44	28	18	7	18
Bureau of Animal Industry	41	71	28	29	382	190	857	40	498	434	368	233	78	28	34
Bureau of Plant Industry	[2]846	164	155	147	49	168	97	5	152	96	65	63	35	32	54
Forest Service	94	8	104	112	34	1,138	170	1,278	569	213	113	131	69	59	35
Bureau of Chemistry	65	10	33	24	9	30	32	....	28	93	52	48	37	18	67
Bureau of Soils	25	1	3	2	4	2	13	2	26	22	19	11	15	4	10
Bureau of Entomology	20	4	19	15	6	97	39	4	36	38	22	16	8	4	11
Bureau of Biological Survey	35	2	12	....	1	6	3	....	11	7	3	7	5	....	5
Division of Publications	7	7	7	64	36	18	13	1	13	8	5	1	6	1	1
Bureau of Statistics	15	7	15	12	16	11	12	2	22	14	12	13	4	1	6
Office of Experiment Stations	13	9	1	1	11	9	13	2	27	32	16	23	30	4	18
Library	....	4	1	2	....	6	9	....	4	1	1	....	1	....	....
Office of Public Roads	63	1	6	9	6	3	10	4	16	3	8	10	8	5	11
Division of Accounts and Disbursements	....	....	1	3	....	7	3	....	10	15	9	4	10	1	3
Insecticide Board	....	3	2	....	....	....	2	1	1	8	4	....	1	....	3
Total	2,522	397	446	552	663	1,712	1,435	1,346	1,589	1,062	751	598	336	166	283

[1] Including 1,240 special river observers, etc., employed intermittently.
[2] Including 650 collaborators and student assistants.

NOTE.—Per diem employees are included in the above statement on the basis of annual salaries.

Distribution, by age, of employees of the United States Department of Agriculture, arranged by bureaus, divisions, and offices, July 1, 1912.

Bureau, division, office, etc.	Age.													
	Less than 20 years.	20 to 24 years.	25 to 29 years.	30 to 34 years.	35 to 39 years.	40 to 44 years.	45 to 49 years.	50 to 54 years.	55 to 59 years.	60 to 64 years.	65 to 69 years.	70 to 74 years.	75 to 79 years.	80 or more years.
Office of the Secretary	9	18	26	49	38	30	23	19	8	9	11	14	2	1
Weather Bureau[1]	103	92	96	99	103	70	56	84	34	40	21	11	1	....
Bureau of Animal Industry	16	126	510	670	644	564	329	226	95	41	47	26	9	4
Bureau of Plant Industry	81	224	361	315	320	251	186	152	116	54	32	8	2	2
Forest Service	88	605	988	831	645	422	187	110	40	30	11	4	2	....
Bureau of Chemistry	12	76	113	116	102	59	35	15	7	4	4	....	....	1
Bureau of Soils	2	22	45	26	36	11	12	1	2	1	1	....	....	....
Bureau of Entomology[1]	7	30	68	41	25	19	16	8	4	3	....	2	....	....
Bureau of Biological Survey	8	11	15	10	10	11	7	6	9	1	3	3	....	....
Division of Publications	8	18	8	20	36	26	15	13	18	9	7	10	....	....
Bureau of Statistics	....	10	13	19	19	16	15	14	17	13	13	8	4	1
Office of Experiment Stations	5	22	51	44	26	25	19	1	4	3	4	2	....	....
Library	1	5	5	4	5	4	3	1	....	....	....	....	....	....
Office of Public Roads	1	23	30	25	34	18	11	7	6	2	3	....	....	....
Division of Accounts and Disbursements	1	8	14	14	11	6	3	6	2	....	1	....	....	....
Insecticide Board	2	5	10	5	2	1	....	....	....	....	....	....	....	....
Total	344	1,295	2,353	2,288	2,056	1,533	917	663	362	210	158	88	20	9

[1] Information concerning 1,240 employees of the Weather Bureau, and 112 field employees of the Bureau of Entomology, all rendering intermittent service; also 210 employees in other bureaus, offices, and divisions, is not available.

ESTABLISHMENT AND GROWTH OF THE DEPARTMENT OF AGRICULTURE.

Growth of the force of the department from Sept. 30, 1863, to July 1, 1912.

Date.	Number employed.	Date.	Number employed.
1863, Sept. 30	29	1899, July 1	2,965
1867, Sept. 30	99	1900, Nov. 16	3,128
1871, Sept. 30	84	1901, July 1	3,388
1873, Sept. 30	92	1902, July 1	3,789
1875, Sept. 30	90	1903, July 1	4,200
1877, Sept. 30	77	1904, July 1	4,504
1879, June 30	93	1905, July 1	5,446
1881, July 1	108	1906, July 1	6,242
1883, July 1	239	1907, July 1	9,107
1885, July 1	214	1908, July 1	10,420
1887, July 1	328	1909, Mar. 4	10,280
1889, July 1	488	1909, July 1	11,140
1891, July 1 [1]	1,577	1910, July 1	12,480
1893, July 1	1,870	1911, July 1	12,704
1895, July 1	2,043	1912, July 1	13,858
1897, July 1	2,444		

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[1] The large increase of July 1, 1891, resulted from the transfer of the Weather Bureau to the Department of Agriculture on that date.

COMMISSIONERS AND SECRETARIES OF AGRICULTURE.

Name and length of service of each Commissioner and of each Secretary of Agriculture since the organization of the United States Department of Agriculture, July 1, 1862.

Names.	Rank.	Appointed under the administration of President—	When appointed.	Service terminated.
Isaac Newton	Commissioner	Abraham Lincoln	July 1, 1862	June 19, 1867
John W. Stokes	do	Andrew Johnson	June 20, 1867	Dec. 4, 1867
Horace Capron	do	do	Dec. 5, 1867	July 31, 1871
Frederick Watts	do	Ulysses S. Grant	Aug. 1, 1871	June 30, 1877
Wm. G. Le Duc	do	Rutherford B. Hayes	July 1, 1877	June 30, 1881
Geo. B. Loring	do	James A. Garfield	July 1, 1881	Apr. 3, 1885
Norman J. Colman	do	Grover Cleveland	Apr. 4, 1885	Feb. 12, 1889
Do	Secretary	do	Feb. 13, 1889	Mar. 6, 1889
J. M. Rusk	do	Benjamin Harrison	Mar. 7, 1889	Mar. 6, 1893
J. Sterling Morton	do	Grover Cleveland	Mar. 7, 1893	Mar. 5, 1897
James Wilson	do	William McKinley	Mar. 6, 1897	
Do	do	do	Mar. 6, 1901	
Do	do	Theodore Roosevelt	Mar. 6, 1905	
Do	do	William H. Taft	Mar. 5, 1909	

POSITIONS FOR WHICH SPECIAL EXAMINATIONS WERE HELD, JULY 1, 1911, TO JUNE 30, 1912.

Dairy chemist.
Dairyman (dairy farming).
Dairyman (butter making).
Dairyman (market milk investigations).
Assistant in bacteriology.
Inspector's assistant.
Veterinary inspector.
Animal husbandman.
Dairyman.
Preparator.
Assistant pharmacologist.
Microanalyst.
Assistant chemist.
Food and drug inspector.
Bacteriological chemist.
Laboratory helper.
Assistant pharmaceutical chemist.
Pharmaceutical chemist.
Medico chemical analyst.
Food technologist.
Foreman.
Preparator.
Entomological draftsman.
Chief of Drainage Investigations.
Specialist of rural engineering.
Specialist in botany.
Irrigation engineer.
Messenger boy.
Watchman-fireman.
Superintendent of telephone construction.
Practical paper maker.

Assistant chemist in forest products.
Chemical engineer in forest products.
Chemist in forest products.
Assistant engineer in forest products.
Laboratory aid and engineer.
Assistant chemical engineer in forest products.
Engineer in forest products.
Statistician in forest products.
Forest clerk.
Land law clerk.
Xylotomist.
Assistant forest ranger.
Laboratory assistant in timber tests.
Laboratory aid and engineer.
Assistant engineer in forest products.
Scientific assistant in forest distribution.
Scientific assistant in library science.
Agriculturist.
Assistant in farm management.
Scientific assistant in farm equipment.
Laboratory aid.
Assistant in farm cost accounting.
Scientific assistant in plant pathology.
Assistant in grain standardization.
Forest pathologist.
Assistant farm superintendent.
Horticulturist.
Assistant horticulturist.
Laboratory aid.
Agronomist in oat investigations.
Assistant in agricultural technology.
Assistant in crop acclimatization.
Botanical artist.
Plant pathologist.
Assistant in grain standardization.
Laboratory aid.
Aid in grain standardization.
Assistant chemist in sugar plant investigations.
Assistant agriculturist.
Senior highway engineer.
Expert tracer and bridge draftsman.
Soil laboratory assistant.
Scientist in soil survey.
Soil scientist in laboratory investigations.
Soil bibliographer (male).
Examiner of surveys.
Record examiner.
Law examiner.
Repairman.

DEATHS IN THE DEPARTMENT DURING THE FISCAL YEAR ENDED JUNE 30, 1912.

[Those marked * were stationed in Washington, D. C.]

Name.	State.	Position.	Bureau, division, or office.	Salary per annum.	Date of death.	Age.
					1911.	
Herbert L. Hurd	Wash.	Forest ranger	Forest Service	$1,300	June 18	34
*Harris E. Sawyer	Mass.	Fermentation chemist.	Chemistry	(1)	July 15	43
*Daniel W. Coquillett	Cal.	Assistant	Entomology	1,800	July 8	55
Charles H. Deviney	Wyo.	Assistant forest ranger.	Forest Service	1,100	do	25
Ora C. McKinney	Ind.	Inspector's assistant.	Animal Industry	840	July 10	27
*Annie Parker	Pa.	Folder	Publications	840	July 24	71
Raymond H. Pond	Tex.	Collaborator	Plant Industry	(2)	July 26	36
John P. Murray	Wyo.	Assistant forest ranger.	Forest Service	1,100	Aug. 3	29
Martin C. Reidy	Iowa.	Meat inspector	Animal Industry	1,200	Aug. 26	45
Henry L. Boldenweck	Cal.	Deputy forest ranger	Forest Service	1,400	Sept. 6	26
Walter A. Greenlaw	Mass.	Meat inspector	Animal Industry	1,200	Sept. 26	34
John H. Harris	N. Y.	do	do	1,000	Sept. 30	49
Alexander W. Proctor	Tex.	Agent	Plant Industry	(3)	Nov. 4	66
*David W. Stier	Ohio.	Clerk	Statistics	1,600	Nov. 22	59
*Harry Crompton	D. C.	Messenger	Animal Industry	840	Nov. 23	41
Erle T. Very	Kans.	Clerk (forest)	Forest Service	1,200	Dec. 15	20
Charles W. Rowse	Ind.	Stock examiner	Animal Industry	1,200	Dec. 25	57
					1912.	
Ora O. Saunders	Ill.	Meat inspector	do	1,000	Jan. 7	32
*Amanda Lomax	D. C.	Charwoman	Weather Bureau	360	Jan. 19	42
Harry E. Moreland	Colo.	Forest guard	Forest Service	(4)	Jan. 28	73
Thomas J. Anderson	Kans.	State statistical agent.	Statistics	900	Jan. 31	43
John T. McWilliams	Tex.	Special agent	Plant Industry	(3)	do	63
*Elsie R. Coale	N. Y.	Clerk	Forest Service	900	Feb. 14	45
Herchman W. Grasse	Minn.	Assistant observer	Weather Bureau	1,000	Feb. 16	62
Theodore F. Townsend	Pa.	Observer	do	1,200	Feb. 22	74
Thomas W. Carscallen	N.Mex.	Assistant forest ranger.	Forest Service	1,100	Feb. 29	40
Ballard R. Garrett	Cal.	do	do	1,100	Mar. 8	45
George J. Reinsch	Wis.	Clerk	Animal Industry	1,000	Mar. 13	74
Charles F. Hatch	D. C.	Statistician in forest products.	Forest Service	1,500	Mar. 26	29
*Meta T. McLaws	Ga.	Clerk	do	900	Mar. 29	50
William Falk	Mo.	Meat inspector	Animal Industry	1,000	Apr. 2	37

[1] $[illegible] per day when actually employed.
[2] $1 per month.
[3] $37.50 per month.
[4] $2.50 per day when actually employed.

Deaths in the department during the fiscal year ended June 30, 1912—Continued.

Name.	State.	Position.	Bureau, division, or office.	Salary per annum.	Date of death.	Age.
Cyrus T. McCall	Idaho.	Assistant forest ranger.	Forest Service	$1,100	1912. Apr. 4	28
John H. Mullison	Wyo	Forest ranger	do	1,300	Apr. 6	70
Eugene E. Spencer	Tex	Observer	Weather Bureau	1,200	do	47
William A. Bitner	Ill	Inspector's assistant.	Animal Industry	1,000	Apr. 7	75
Frank T. Dison	Kans	Meat inspector	do	1,320	Apr. 20	40
*John P. Montgomery	D. C	Unskilled laborer	Plant Industry	600	Apr. 21	35
Thomas F. Wells	Ariz	Assistant forest ranger.	Forest Service	1,100	May 26	29
*William Brough	Md	Instrument maker	Animal Industry	1,200	May 29	39
James Kenealy	Ohio	Local forecaster	Weather Bureau	2,000	June 17	60
Daisy W. Brinson	N. C	Collaborator	Plant Industry	1	do	26
Patrick J. Nichols	Kans	Meat inspector	Animal Industry	1,000	June 24	49
Charles F. Cooley	Utah	Forest ranger	Forest Service	1,400	June 28	33
Jeff Davis McGee	Ga	Agent	Plant Industry	(1)	June 30	41

[1] $75 per month.

PRINCIPAL OFFICERS UNITED STATES DEPARTMENT OF AGRICULTURE, JULY 1, 1912.

OFFICE OF THE SECRETARY.

Name.	Position.	Salary per annum.
James Wilson	Secretary of Agriculture	$12,000
Willet M. Hays	Assistant Secretary	5,000
George P. McCabe	Solicitor	5,000
Charles C. Clark	Chief clerk and custodian of buildings	3,500
Robt. M. Reese	Private secretary to the Secretary of Agriculture	2,500
R. W. Roberts	Appointment clerk	2,000
George W. Knorr	Private secretary to the Assistant Secretary of Agriculture.	1,600
Cyrus B. Lower	Chief of supply division	2,000
Lewis Jones	Chief engineer and captain of the watch	2,000

WEATHER BUREAU.

Willis L. Moore	Chief of bureau	$6,000
Henry E. Williams	Assistant chief	3,000
Daniel J. Carroll	Chief clerk and executive assistant	3,000
Prof. Harry C. Frankenfield [1]	Forecasting	3,500
Edward H. Bowie [1]	District forecaster	3,000
Prof. Harry C. Frankenfield	In charge of river and flood division	3,500
Prof. Charles F. Marvin	In charge of instrument division	3,500
Henry L. Heiskell	In charge of division of observations and reports	2,500
Preston C. Day	In charge of climatological division	2,500
Edgar B. Calvert	In charge of accounts division	2,500
George E. Hunt	In charge of observatory	1,800
CHIEFS OF DIVISION.		
John P. Church	Publications	2,000
Robert Seyboth	Supplies	2,000
Theodore T. Moore	Telegraph	2,000
Charles F. Talman	Librarian	2,000
IN CHARGE OF FORECAST DISTRICTS.		
Prof. Henry J. Cox [2]	Chicago, Ill	3,500
Prof. Alexander G. McAdie [2]	San Francisco, Cal	3,500
Frederick H. Brandenburg [2]	Denver, Colo	2,400
Isaac M. Cline [2]	New Orleans, La	2,400
Edward A. Beals [2]	Portland, Oreg	2,400
DISTRICT FORECASTERS.		
John W. Smith	Boston, Mass	2,400
David Cuthbertson	Buffalo, N. Y	2,400
James H. Scarr	New York, N. Y	2,400
Montrose W. Hayes [2]	St. Louis, Mo	2,400

[1] Alternate monthly.

[2] Also climatological editor.

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

WEATHER BUREAU—Continued.

Name.	Position.	Salary per annum.
INSPECTORS.		
Norman B. Conger	Detroit, Mich	$2,750
Henry B. Hersey	Milwaukee, Wis	2,750
PROFESSORS OF METEOROLOGY.		
J. Warren Smith	Columbus, Ohio	2,500
Ferdinand J. Walz [1]	Louisville, Ky	2,500
CLIMATOLOGICAL EDITORS.		
Charles F. von Herrmann	Atlanta, Ga	2,000
George M. Chappel [2]	Des Moines, Iowa	1,000
Bernard Bunnemeyer	Houston, Tex	2,000
Wilford M. Wilson	Ithaca, N. Y	2,000
Alfred H. Thiessen	Salt Lake City, Utah	1,800
STAFF OF THE MOUNT WEATHER OBSERVATORY.		
Prof. Alfred J. Henry	Executive officer	3,500
Prof. William J. Humphreys	Consulting physicist	3,500
Prof. Cleveland Abbe	Editor	3,000
Prof. Herbert H. Kimball	In charge of solar radiation work	2,500
William R. Blair	In charge of physical laboratory and upper air research.	2,000

BUREAU OF ANIMAL INDUSTRY.

Alonzo D. Melvin	Chief of bureau	$5,000
Arthur M. Farrington	Assistant chief	3,000
Charles C. Carroll	Chief clerk	2,500
CHIEFS OF DIVISION.		
George M. Rommel	Division of animal husbandry	3,000
Marion Dorset	Biochemic division	4,000
B. H. Rawl	Dairy division	3,500
Rice P. Steddom	Inspection division	3,500
John R. Mohler	Pathological division	4,000
R. W. Hickman	Quarantine division	3,000
Brayton H. Ransom	Zoological division	2,750
James M. Pickens	Editor and compiler	2,250
E. C. Schroeder	Superintendent of experiment station	3,250

BUREAU OF PLANT INDUSTRY.

ADMINISTRATIVE.		
Beverly T. Galloway	Pathologist and physiologist and chief of bureau	$5,000
William A. Taylor	Pomologist and assistant chief of bureau	4,000
James E. Jones	Chief clerk	2,500
J. E. Rockwell	Officer in charge of publications	2,000
W. P. Cox	Officer in charge of records	2,000
PATHOLOGY.		
Erwin F. Smith	Pathologist in charge of laboratory of plant pathology.	4,000
Haven Metcalf	Pathologist in charge of laboratory of forest pathology.	2,760
William A. Orton	Pathologist in charge of cotton and truck-crop diseases and sugar-plant investigations.	2,750
Merton B. Waite	Pathologist in charge of fruit disease investigations	3,240
PHYSIOLOGY.		
Walter T. Swingle	Physiologist in charge of crop physiology and breeding investigations.	3,240
Karl F. Kellerman	Physiologist in charge of soil bacteriology and water-purification investigations.	2,760
O. F. Cook	Bionomist in charge of crop acclimatization and adaptation investigations.	3,000
Rodney H. True	Physiologist in charge of drug plant, poisonous plant, fermentation and general physiological investigations.	3,240

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[1] Also climatological editor.

[2] Receives additional compensation from State.

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

BUREAU OF PLANT INDUSTRY—Continued.

Name.	Position.	Salary per annum.
TECHNOLOGY.		
Nathan A. Cobb	Agricultural technologist in charge of crop-technology investigations.	$4,000
Lyster H. Dewey	Botanist in charge of fiber investigations	2,760
J. W. T. Duvel	Crop technologist in charge of grain standardization	2,750
Lyman J. Briggs	Physicist in charge of physical investigations	3,000
Edgar Brown	Botanist in charge of seed laboratory	2,750
AGRONOMY.		
Carleton R. Ball	Acting cerealist in charge of cereal investigations	2,520
W. W. Garner	Physiologist in charge of tobacco and nutrition investigations.	2,500
Thomas H. Kearney	Physiologist in charge of alkali and drought-resistant plant breeding investigations.	2,760
Charles P. Hartley	Physiologist in charge of corn investigations	2,400
Frederick V. Colville	Botanist in charge of taxonomic and range investigations.	3,500
E. C. Chilcott	Agriculturist in charge of dry-land agriculture investigations.	3,240
C. V. Piper	Agrostologist in charge of forage-crop investigations	3,000
DEMONSTRATIONS.		
W. J. Spillman	Agriculturist in charge of farm-management investigations.	4,000
Bradford Knapp	Special agent in charge of farmers' cooperative demonstration work.	3,750
Carl S. Scofield	Agriculturist in charge of western irrigation agriculture.	3,000
SEED AND PLANT INTRODUCTION AND DISTRIBUTION.		
Leon M. Estabrook	Assistant in seed and plant introduction and distribution.	2,500
David G. Fairchild	Agricultural explorer in charge of foreign seed and plant introduction.	3,000

FOREST SERVICE.

Henry S. Graves	Forester and chief	$5,000
Albert F. Potter	Associate forester	4,000
Herbert A. Smith	Editor	3,000
Findley Burns	Chief of publication	2,100
George C. Sudworth	Dendrologist	3,000
Daniel D Bronson	General inspector	2,500
OFFICE OF ACCOUNTS, FOREST SERVICE BRANCH.		
Mathias E. Fagan	Chief	2,500
Ernest A. Melzar	Assistant chief	2,000
BRANCH OF OPERATION.		
James B. Adams	Assistant forester in charge	3,750
Franklin W. Reed	Forest inspector	2,500
George G. Anderson	Assistant in office methods	2,100
Fred G. Plummer	Chief, office of geography	2,700
George A. Bentley	Chief, office of maintenance	1,600
BRANCH OF SILVICULTURE.		
Wm. B. Greeley	Assistant forester in charge	3,250
Earle H. Clapp	Forest inspector	2,500
OFFICE OF STATE COOPERATION.		
J. Girven Peters	Chief	2,200
OFFICE OF SILVICS.		
Raphael Zon	Chief	2,500
Samuel T. Dana	Assistant chief	2,200
Louis S. Murphy	In charge, office of forest management in the East	2,000

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

FOREST SERVICE—Continued.

Name.	Position.	Salary per annum.
BRANCH OF GRAZING.		
Albert F. Potter	Associate forester in charge	
Leon F. Kneipp	Assistant forester	$2,800
Will C. Barnes	Inspector of grazing	2,700
BRANCH OF LANDS.		
James B. Adams	Assistant forester in charge	
Charles H. Squire	In charge, office of occupancy	2,000
James I. Parker	Chief, office of claims	2,750
Oscar C. Merrill	Chief engineer	3,000
BRANCH OF PRODUCTS.		
McGarvey Cline	Director (Madison, Wis.)	3,000
Howard F. Weiss	Assistant director	2,400
OFFICE OF WOOD UTILIZATION AND EASTERN PRODUCTS DISTRICT. (Washington, D. C.)		
O. T. H. Swan	In charge	2,000
ACQUISITION OF LAND UNDER THE WEEKS LAW.		
Wm. L. Hall	Assistant forester in charge	3,500
Karl W. Woodward	Forest examiner	2,200
DISTRICT OFFICES.		
District 1, Missoula, Mont.:		
Ferdinand A. Silcox	District forester	2,800
Edwin W. Kramer	District engineer	2,200
John F. Preston	Office of operation, assistant district forester	2,200
Robert Y. Stuart	Office of silviculture, assistant district forester	2,400
Charles H. Adams	Office of grazing, assistant district forester	2,200
Richard H. Rutledge	Office of lands, assistant district forester	2,400
District 2, Denver, Colo.:		
Smith Riley	District forester	3,000
Theodore W. Norcross	District engineer	2,400
Fred W. Morrell	Office of operation, assistant district forester	2,400
Sydney L. Moore	Office of silviculture, assistant district forester	2,400
Jesse W. Nelson	Office of grazing, assistant district forester	2,400
Carl J. Stahl	Office of lands, assistant district forester	2,400
District 3, Albuquerque, N. Mex.:		
Arthur C. Ringland	District forester	2,900
Alpheus O. Waha	Office of operation, assistant district forester	2,400
Arthur C. Recknagel	Office of silviculture, assistant district forester	2,300
John Kerr	Office of grazing, assistant district forester	2,400
Frank C. W. Pooler	Office of lands, assistant district forester	2,400
District 4, Ogden, Utah:		
Edward A. Sherman	District forester	3,000
Jos. P. Martin	District engineer	2,400
Arthur C. McCain	Office of operation, assistant district forester	2,400
Ovid M. Butler	Office of silviculture, assistant district forester	2,300
Homer E. Fenn	Office of grazing, assistant district forester	2,400
Timothy C. Hoyt	Office of lands, assistant district forester	2,400
A. Mark Smith	Supply depot, property clerk	2,000
Joseph G. Falck	Property auditor	1,800
District 5, San Francisco, Cal.:		
Coert Du Bois	District forester	2,800
Walter L. Huber	District engineer	2,400
Roy Headley	Office of operation, assistant district forester	2,400
Trueman D. Woodbury	Office of silviculture, assistant district forester	2,400
John H. Hatton	Office of grazing, assistant district forester	2,500
Louis A. Barrett	Office of lands, assistant district forester	2,400
C. Stowell Smith	Office of products, assistant district forester	2,400
District 6, Portland, Oreg.:		
George H. Cecil	District forester	2,800
W. E. Herring	District engineer	2,600
Charles H. Flory	Office of operation, assistant district forester	2,400
Fred E. Ames	Office of silviculture, assistant district forester	2,400
Thomas P. MacKenzie	Office of grazing, assistant district forester	2,200
Clarence J. Buck	Office of lands, assistant district forester	2,400
Joseph B. Knapp	Office of products, assistant district forester	2,400

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

BUREAU OF CHEMISTRY.

Name.	Position.	Salary per annum.
R. E. Doolittle	Acting chief of bureau	$4,000
F. L. Dunlap	Associate chemist	4,000
W. D. Bigelow	Assistant chief of bureau and chief of division of foods.	4,000
F. B. Linton	Chief clerk	2,000
J. G. Shibley	Supervising clerk, interstate and import records	2,500
G. O. Savage	Editor	1,440
A. E. Draper	Librarian	1,800
DIVISION OF FOODS.		
W. D. Bigelow	Chief of division	4,000
L. M. Tolman	Chief, food inspection laboratory	3,250
E. M. Chace	Chief, food technology laboratory and assistant chief of division.	3,000
H. S. Bailey	Chief, oil, fat, and wax laboratory	2,040
DIVISION OF DRUGS.		
L. F. Kebler	Chief of division	4,000
G. W. Hoover	Chief, drug inspection laboratory	2,500
W. O. Emery	Chief, synthetic products laboratory	2,760
William Salant	Chief, pharmacological laboratory	3,250
E. K. Nelson	Chief, essential oils laboratory	2,040
FOOD AND DRUG INSPECTION.		
W. G. Campbell	Chief inspector	2,760
MISCELLANEOUS DIVISION.		
J. K. Haywood	Chief of division	3,500
W. W. Skinner	Chief, water laboratory	2,760
G. L. Bidwell	Acting chief, cattle food and grain laboratory	1,800
C. C. McDonnell	Chief, insecticide and fungicide laboratory	2,500
CONTRACTS LABORATORY.		
P. H. Walker	Chief	3,000
DAIRY LABORATORY.		
G. E. Patrick	Chief	3,000
LEATHER AND PAPER LABORATORY.		
F. P. Veitch	Chief	3,000
MICROCHEMICAL LABORATORY.		
B. J. Howard	Chief	2,760
PHYSICAL CHEMISTRY LABORATORY.		
C. S. Hudson	Chief	2,250
SUGAR LABORATORY.		
A. H. Bryan	Chief	2,760
NITROGEN SECTION.		
T. C. Trescot	In charge	3,000
FOOD RESEARCH LABORATORY.		
M. E. Pennington	Chief	3,000
SPECIAL INVESTIGATIONS.		
F. C. Weber	In charge, physiological chemistry (animal)	2,520
J. A. Le Clerc	In charge, physiological chemistry (plant)	3,000
G. W. Stiles, jr	In charge, bacteriological chemistry	2,500
Wm. B. Alwood	In charge, enological chemistry	2,520
FOOD AND DRUG INSPECTION LABORATORIES.		
B. H. Smith	Chief, Boston, Mass	3,000
W. L. Du Bois	Chief, Buffalo, N. Y	2,250
A. L. Winton	Chief, Chicago, Ill	3,500

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

BUREAU OF CHEMISTRY—Continued.

Name.	Position.	Salary per annum.
FOOD AND DRUG INSPECTION LABORATORIES—continued.		
B. R. Hart	Chief, Cincinnati, Ohio	$2,280
R. S. Hiltner	Chief, Denver, Colo	2,520
H. L. Schulz	Chief, Detroit, Mich	2,280
G. M. Bartlett	Acting chief, Galveston, Tex	1,800
A. W. Hansen	Acting chief, Honolulu, Hawaii	2,040
F. W. Liepsner	Chief, Kansas City, Mo	2,040
R. W. Balcom	Chief, Nashville, Tenn	2,040
W. J. McGee	Chief, New Orleans, La	1,600
A. W. Ogden	Acting chief, New York, N. Y	2,520
S. H. Ross	Chief, Omaha, Nebr	2,280
C. S. Brinton	Chief, Philadelphia, Pa	2,520
M. C. Albrech	Chief, Pittsburgh, Pa	2,040
A. L. Knisely	Chief, Portland, Oreg	2,280
D. B. Bisbee	Chief, St. Louis, Mo	2,040
A. S. Mitchell	Chief, St. Paul, Minn	4,000
R. A. Gould	Chief, San Francisco, Cal	3,000
A. E. Taylor	Acting chief, San Juan, P. R	2,280
W. C. Burnet	Chief, Savannah, Ga	2,280
H. M. Loomis	Chief, Seattle, Wash	2,250
REFEREE BOARD.		
Dr. Ira Remsen	Consulting scientific expert to the secretary of Agriculture and chairman of the referee board.	2,000
Dr. Russell H. Chittenden	Consulting scientific expert to the Secretary of Agriculture.	2,000
Dr. Theobald Smith	do	2,000
Dr. John H. Long	do	2,000
Dr. Alonzo E. Taylor	do	2,000

BUREAU OF SOILS.

Name.	Position.	Salary per annum.
Milton Whitney	Chief of bureau	$4,000
A. G. Rice	Chief clerk	2,000
Geo. W. Baumann	Executive assistant	2,000
CHEMICAL INVESTIGATIONS.		
Frank K. Cameron	Scientist	3,750
R. B. Moore	do	3,000
SOIL FERTILITY INVESTIGATIONS.		
Oswald Schreiner	Scientist	3,500
E. C. Shorey	do	2,500
M. X. Sullivan	do	2,220
B. E. Brown	do	2,040
INVESTIGATIONS OF FERTILIZER RESOURCES.		
Edward E. Free	Scientist	2,500
Wm. H. Ross	do	2,000
J. W. Turrentine	do	2,000
SOIL-WATER INVESTIGATIONS.		
W J McGee	An expert	3,000
SOIL-SURVEY INVESTIGATIONS.		
Curtis F. Marbut	Scientist	3,500
J. A. Bonsteel	do	3,250
H. H. Bennett	do	2,280
J. E. Lapham	do	2,280
Macy H. Lapham	do	2,280
W. G. Smith	do	2,000

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

BUREAU OF ENTOMOLOGY.

Name.	Position.	Salary per annum.
L. O. Howard	Entomologist and chief	$4,500
C. L. Mariatt	Entomologist and acting chief in absence of chief	3,500
R. S. Clifton	Executive assistant	2,250
W. F. Tastet	Chief clerk	1,800
F. H. Chittenden	In charge of truck crop and stored product insect investigations.	3,000
A. D. Hopkins	In charge of forest insect investigations	3,000
W. D. Hunter	In charge of southern field crop insect investigations	3,000
F. M. Webster	In charge of cereal and forage insect investigations	3,000
A. L. Quaintance	In charge of deciduous fruit insect investigations	3,000
E. F. Phillips	In charge of bee culture	2,750

BUREAU OF BIOLOGICAL SURVEY.

H. W. Henshaw	Biologist and chief of bureau	$3,500
C. Hart Merriam	Consulting biologist	1,000
T. S. Palmer	Assistant chief and in charge of game preservation	3,250
A. K. Fisher	Assistant in charge of economic investigations	3,000
Vernon Bailey	Assistant in charge of biological investigations	3,000
A. B. Morrison	Chief clerk	1,800

DIVISION OF PUBLICATIONS.

Jos. A. Arnold	Editor and chief	$3,250
B. D. Stallings	Editor and assistant chief	2,250
A. I. Mudd	Chief clerk	2,000
F. J. P. Cleary	Assistant in charge of document section	2,000
L. S. Williams	Assistant in charge of illustrations	2,000
C. H. Greathouse	Assistant in charge of indexing	2,000

BUREAU OF STATISTICS.

Victor H. Olmsted	Statistician and chief of bureau	$4,000
Nat C. Murray	Associate statistician	3,000
Samuel A. Jones	Assistant statistician	2,500
Frank G. Kelsey	Chief clerk	1,800
George K. Holmes	Chief of division of production and distribution	3,500
Charles M. Daugherty	Chief of division of reference and research	2,500
Fred J. Blair	Chief of division of domestic crop reports	2,500

OFFICE OF EXPERIMENT STATIONS.

A. C. True	Director	$4,500
E. W. Allen	Assistant director, and editor of Experiment Station Record.	3,500
Mrs. C. E. Johnston	Chief clerk	2,000
W. H. Beal	Chief of editorial division	2,700
Walter H. Evans	Chief of division of insular stations	2,700
Samuel Fortier	Chief of irrigation investigations	3,750
C. C. Georgeson	In charge of Alaska experiment stations	3,000
J. B. Thompson	In charge of Guam experiment stations	2,500
E. V. Wilcox	In charge of Hawaii experiment stations	3,000
D. W. May	In charge of Porto Rico experiment stations	3,000
C. F. Langworthy	In charge of nutrition investigations	2,500
D. J. Crosby	Specialist in agricultural education	2,400
John Hamilton	Specialist in farmers' institutes	2,250

LIBRARY.

Claribel R. Barnett	Librarian	$2,000
Emma B. Hawks	Assistant Librarian	1,600

Principal officers United States Department of Agriculture, July 1, 1912—Continued.

OFFICE OF PUBLIC ROADS.

Name.	Position.	Salary per annum.
Logan Waller Page	Director	$4,000
Paul D. Sargent	Assistant director	3,500
Vernon M. Peirce	Chief engineer	3,000
Laurence I. Hewes	Chief of economics and maintenance	2,400
Edwin W. James	Chief inspector	2,220
Charles S. Reeve	Assistant chemist	2,000
M. O. Eldridge	Assistant in road management	2,220
Albert T. Goldbeck	Testing engineer	2,040
Edwin C. E. Lord	Petrographer	1,600
William W. Sniffin	Editorial clerk and librarian	1,600
W. Carl Wyatt	Chief clerk	1,900

DIVISION OF ACCOUNTS AND DISBURSEMENTS.

A. Zappone	Chief of division and disbursing clerk	$4,000
E. B. Calvert	Assistant chief	2,750
M. E. Fagan	Chief of office of accounts and fiscal agent	2,500
E. D. Yerby	Supervising auditor	2,250
W. J. Nevius	Cashier and chief clerk	2,000
F. W. Legge	Accountant and bookkeeper	2,000
E. E. Forbes	Auditor	2,000
W. R. Fuchs	Deputy disbursing clerk	2,000
E. A. Melzar	District fiscal agent	2,000
A. H. Cousins	do	2,000
Q. R. Craft	do	2,000
J. J. Duffy	do	2,000
H. I. Loving	do	2,000
F. C. Thompson	do	2,000
J. A. Urbanowicz	do	2,000
W. L. Shuck	In charge central accounting office	1,800

REPORT OF THE INSECTICIDE AND FUNGICIDE BOARD.

U. S. Department of Agriculture,
Insecticide and Fungicide Board,
Washington, D. C., September 30, 1912.

Sir: We have the honor to transmit herewith the first report of the Insecticide and Fungicide Board for the period ending June 30, 1912.

Very respectfully,

M. Dorset,
M. B. Waite,
A. L. Quaintance,
J. K. Haywood,
Members.

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTION.

Responding to a growing demand on the part of the agricultural interests and manufacturers for Federal control of interstate commerce in insecticides, Paris greens, lead arsenates, and fungicides, Congress, in the spring of 1910, passed a bill which, upon approval by the President, April 26, 1910, became law under the title of The Insecticide Act of 1910. By its provisions this law became effective January 1, 1911, but no funds were appropriated for its enforcement until March 6 of that year. The duty of collecting and examining official samples of articles coming within the meaning of the law, and of certifying violations thereunder to the Department of Justice for prosecution, was reposed in the Department of Agriculture. To discharge properly the responsibility thus resting on the department, a board of four scientists, selected from the Bureaus of Animal Industry, Plant Industry, Entomology, and Chemistry, was created to assist the Secretary in carrying on the work. The comparatively short period of the fiscal year 1911 which remained after an appropriation became available was utilized in the selection of the necessary scientific assistants, installation of equipment, and general initiation of the work along all lines. As this is the first report of work done in connection with the enforcement of the insecticide act, it seems fitting to give a brief outline of the methods which have been employed in establishing an orderly arrangement for effectively enforcing the act in so far as that duty devolves upon the Department of Agriculture.

GENERAL OUTLINE OF PROCEDURE.

INTERSTATE SAMPLES.

Official samples of insecticides or fungicides which have entered interstate commerce or have been manufactured or sold within a Territory or the District of Columbia are collected by authorized sample collectors of the Department of Agriculture and are transmitted under seal, accompanied by the necessary evidence of interstate movement, to the Insecticide and Fungicide Board. Each sample is carefully analyzed and tested to determine whether it is adulterated or misbranded within the meaning of the Insecticide Act of 1910. The results of examination are then considered by the Insecticide and Fungicide Board and if the article is found to be in violation of the law recommendation is made to the Secretary of Agriculture, through the Solicitor of the department, that the responsible parties be cited to a hearing in order that they may be given an opportunity to show any fault or error in the findings of the analyst or examiner. Hearings are appointed at such places and are conducted by such officers of the department as may be most convenient for all parties concerned. Reports of hearing proceedings are forwarded to the Insecticide and Fungicide Board for careful review, and if it still appears that any of the provisions of the law have been violated, the facts are certified and all collateral evidence transmitted to the Solicitor, who, in turn, submits the same to the Secretary of Agriculture for reference to the Attorney General and the proper United States attorney, with recommendation that the guilty parties be prosecuted. After judgment of the court, notices of judgment are prepared and given the widest publicity possible.

If the examination of an article discloses neither adulteration nor misbranding, recommendation is made to the Secretary of Agriculture that no further action be taken regarding it.

IMPORT SAMPLES.

Insecticides, Paris greens, lead arsenates, and fungicides imported into the United States from foreign countries are subject to the same restrictions as domestic articles of like character. In cooperation with the Treasury Department a system of import inspection has been devised by means of which importations of articles affected by the insecticide act undergo proper control. As a further measure in securing this result, the State Department, on request of the Department of Agriculture, has prepared and distributed through the United States consuls and consular agents, special invoices, declaration sheets, and circulars containing the law and regulations, in order that foreign exporters may become informed respecting the requirements of the law.

The expenditure entailed in connection with the establishment of inspection service at ports of entry is very great. For this reason it has been regarded as uneconomical to attempt to install, at the present time, separate forces and equipment for the import inspection of insecticides. This work is therefore being done by using the facilities already established at the principal ports of entry in connection with the work of enforcing the Food and Drugs Act of 1906.

Unofficial samples of imported articles coming within the meaning of the law are taken and transmitted to the Insecticide and Fungicide Board at Washington for examination, when, if they are found to be in violation of any of the provisions of the law, instructions are given to detain, and submit an official sample of the next shipment of the article. These instructions are issued to all port food and drug laboratories. If the examination of the official sample confirms the previous findings as determined by the examination of the unofficial sample, the facts are certified to the Secretary of the Treasury by the Secretary of Agriculture, in order that the proper customs officials may be directed to exclude the article from entry into the United States or take such other action as may be warranted.

SAMPLE COLLECTION.

In the beginning official samples of insecticides and fungicides were collected by designated employees of the Bureaus of Chemistry, Animal Industry, Plant Industry, and Entomology, whose bureau assignments entailed more or less travel within prescribed limits. The persons designated were selected with reference to their proximity to the principal jobbing centers of the United States and their ability to collect samples without material interference with their regular bureau duties. This plan was followed successfully for several months, owing to the wide distribution of the leading articles put out by the larger companies. It ultimately became apparent, however, that in order to effectively continue the work of sample collection, it would be necessary to employ men who would devote their entire time to sample collection, factory inspection, seizures, and special investigations. Accordingly, one collector was appointed in January and another in March of the present year, while several others will be required, eventually, as the work develops. During the year, 650 samples were collected, representing 330 different articles produced by 212 different manufacturers, distributed as follows:

Class.	Number of samples.	Number of manufacturers and distributors.
Arsenate of lead	87	25
Bordeaux mixture	29	11
Creosote and cresylic acid preparations	71	37
Fly and moth killers	48	35
Formaldehyde	20	14
Lice killers	75	26
Lime-sulphur solution	21	12
Nicotine preparations	25	11
Paris green	65	14
Potassium and sodium cyanide	2	2
Pyrethrum powders	34	22
Miscellaneous (including 120 different articles)	173	93
Total	650	

EXAMINATION OF SAMPLES.

At regular intervals all interstate and import samples which have arrived during the interim are assigned to the various members of the board for analysis, test, study of labels, and the preparation of reports embodying charges, if any, of adulteration or misbranding.

These reports are laid before the whole board at the weekly sessions and after discussion each case is disposed of in accordance with the facts developed. Cases may be referred back to the board member concerned for check analysis, for more exhaustive tests, or for further investigation, or they may be recommended for permanent abeyance or citation of the parties in interest preliminary to prosecution. The Bureau of Animal Industry makes examinations of insecticides and fungicides intended to be used in combating insects and fungi which may attack horses, cattle, sheep, swine, or goats, and passes upon questions relating to the efficacy of such articles. The Bureau of Plant Industry representative passes on all questions relative to the efficacy and injuriousness of all fungicides intended to be used on vegetation and, in cooperation with the Bureau of Entomology, the injurious effects of insecticides when used on vegetation, carrying on such spraying tests and making such botanical analyses as may be necessary. All questions relative to the efficacy of insecticides and substances which may enter into the composition thereof, other than those assigned to the Bureau of Animal Industry, are determined by the representative of the Bureau of Entomology, for which work an insecticide laboratory and testing grounds are maintained at Vienna, Va. The examination of insecticides and fungicides other than those used on horses, cattle, sheep, swine, or goats is conducted by the Miscellaneous Division of the Bureau of Chemistry, which also passes on questions relating to the composition of such preparations. Therefore laboratories are equipped and maintained in the Bureaus of Animal Industry and Chemistry, while laboratories and testing stations are operated by the Bureaus of Plant Industry and Entomology at Arlington Farm and Vienna, Va., respectively.

Of the 650 cases arising during the year, 246 have been disposed of, 182 being placed in permanent abeyance, while 64 have been transmitted to the Attorney General for prosecution. Seven of the prosecution cases have been considered by the courts with results favorable to the Government's contentions in each case. Of the remaining cases, 43 are undergoing review in the Office of the Solicitor, 45 are awaiting reports of hearing, 43 are held pending receipt of further information or the outcome of prosecutions of the same article on identical charges, while in 273 cases the preliminary examination and necessary tests are incomplete. The large number of cases in the latter class is due to the increased ratio of receipts in the latter months of the year after special collectors took up the sample collection work.

Since the organization of the board, 106 regular and special sessions of the board were held for the purpose of assigning samples, disposing of cases, and for the transaction of other routine business.

On June 30, 1912, a total of 16 persons was employed in the different bureaus in connection with the enforcement of the law, classified as follows: Two experts, 8 chemists, 2 entomological assistants, 1 agent, 1 clerk, 1 laboratory helper, and 1 laborer. These assistants were added from time to time as competent persons were found, many of them being recent appointees. The above figures do not include the sample collectors nor the force of the executive office.

HEARINGS.

Section 4 of the Insecticide Act of 1910 is as follows:

> SEC. 4. That the examination of specimens of insecticides, Paris greens, lead arsenates, and fungicides shall be made in the Department of Agriculture, by such existing bureau or bureaus as may be directed by the Secretary, for the purpose of determining from such examination whether such articles are adulterated or misbranded within the meaning of this act; and if it shall appear from any such examination that any of such specimens are adulterated or misbranded within the meaning of this act, the Secretary of Agriculture shall cause notice thereof to be given to the party from whom such sample was obtained. Any party so notified shall be given an opportunity to be heard, under such rules and regulations as may be prescribed as aforesaid, and if it appears that any of the provisions of this act have been violated by such party, then the Secretary of Agriculture shall at once certify the facts to the proper United States district attorney, with a copy of the results of the analysis or the examination of such article duly authenticated by the analyst or officer making such examination, under the oath of such officer. After judgment of the court, notice shall be given by publication in such manner as may be prescribed by the rules and regulations aforesaid.

By virtue of section 3 of the Insecticide Act of 1910 the duty of making uniform rules and regulations for carrying out the provisions of the act devolves upon the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce and Labor.

When an official sample of an insecticide or fungicide has been found by the department to be adulterated or misbranded, before prosecution can be begun, the law requires that the parties in interest be given an opportunity to make a statement, either oral or written, in person or by attorney. This is officially designated a "hearing." The Rules and Regulations for Carrying Out the Provisions of the Insecticide Act of 1910 provide that hearings shall be held before the Secretary of Agriculture or such other person or persons as he may direct.

In conformity, therefore, with the Insecticide Act of 1910 and regulations issued thereunder, hearings were held in many of the principal cities throughout the United States in connection with cases which had arisen under the law. The place of holding the hearing in each case was selected with due regard to the convenience of the parties cited and proper conservation of the interests of the Government. Hearings may readily be divided into three classes: Those accorded to original manufacturers, and those granted to jobbers and to dealers. Respecting the first class, appearance is generally made either in person or by attorney. The facts of the cases are thoroughly canvassed and a minute of the proceedings is taken, which becomes part of the record in the case. Many matters of detail enter into the holding of hearings, all of which have an important bearing on the case and require thoughtful treatment. Dealers from whom the official samples are actually purchased and middlemen (jobbers) are cited in the same manner as manufacturers, but answer the citations for the most part by filling out printed forms containing collateral data pertaining to the interstate movement, sale, and guaranty of the article, if guaranteed. Corroborative evidence of their statements is submitted in the form of invoices, freight bills, written guaranties, etc. Upward of 200 formal hearings were held during the year, of which 17 were conducted by the Insecticide and Fungicide Board, and the remainder by chiefs of food and drug inspection laboratories, and inspectors in charge of meat inspection districts of the Bureau of Animal Industry. Approximately 250 jobbers and dealers were granted hearings, in the manner above described, through arrangements effected by the executive officer of the board.

Six special hearings were held by the board during the year for the purpose of discussing with manufacturers general questions of common interest relating to the construction and effective enforcement of the insecticide act.

INSECTICIDE DECISIONS.

Insecticide decisions, while they do not have the force and effect of the Insecticide Act of 1910, or of the regulations officially promulgated thereunder, are regarded as a valuable adjunct in attaining harmony of view between the department and manufacturers respecting the solution of dubitable questions which may arise concerning the precise meaning or proper construction to be given to different provisions of the act. They serve to acquaint interested parties with the attitude of the department relative to the questions at issue and it is manifest that if the department's interpretation of the law is accepted there can be no divergence of opinion, and prosecutions under the law may be avoided. Whenever inquiries of the same nature are secured in sufficient number to indicate a general desire for the illumination of an apparently obscure or indistinct clause of the law or regulations, a decision is prepared and published setting forth the department's view of the matters involved, after due consideration of all the factors pertaining thereto. However, many of the questions which have arisen are so complex as to be determinable only after the most exhaustive laboratory processes in cooperation with thorough field tests conducted during such crop-growing seasons as may be suitable. Six insecticide decisions have thus far been issued, while several others of far-reaching importance are in course of preparation, which, if approved, will be published in the near future.

SPECIAL INVESTIGATIONS.

INSECT POWDER.

The many requests received from manufacturers and dealers for a decision giving the position of the department regarding the use of "insect flower stems" and touching the propriety of the use of the name "insect powder" in connection with proprietary preparations composed of other ingredients than the powdered flowers of certain species of chrysanthemum, indicated the necessity of special investigation of this subject. Through the courtesy of the Bureau of Chemistry an expert was sent to the various importing trade centers, who interviewed a large number of importers and wholesalers, collected samples of the raw and finished product, studied the processes of manufacture, and embodied all of the data obtained in a comprehensive report. Written and oral statements were secured and practical tests with various pyrethrum products were carried out. All of the data thus obtained was carefully digested by the board and the conclusions published as Insecticide Decision No. 1.

PARIS GREEN.

Among the very first questions which arose in connection with the enforcement of the insecticide act was that of establishing a fair method by which the amount of arsenic in water-soluble forms in any green might be determined, in view of the provision of the law which limits that ingredient to the equivalent of not more than 3½ per cent of arsenious oxide. In compliance with the request of many manufacturers a public hearing was held in order that they might be given an opportunity to present their views. The meeting was largely attended, and all of the leading manufacturers in the United States were represented. Following this, laboratory experiments were made with a large number of greens to determine the rapidity of "breaking up" for different periods and under variable conditions. Spraying tests were also made. The results, however, were not considered sufficiently conclusive. Further investigations are progressing with a large variety of greens which are undergoing exhaustive laboratory tests and are the subjects of experiment on a large scale in the field.

TOBACCO POWDERS.

The manufacturing interests engaged in the production of tobacco dust or powder for fumigation or other insecticidal purposes have been uncertain as to the proper method of declaring the inert ingredients, as required by the law. This question has received a great deal of attention during the past year. An expert under direction of the board has visited 53 firms representing all phases of the tobacco industry as carried on in 15 different cities. In addition to this investigation of the tobacco industry, extensive experiments have been carried out with tobacco powders on various insects. A final conclusion as to the proper method of labeling tobacco powders under the insecticide act has not yet been reached, but it is hoped that a decision will be issued at an early date.

BORDEAUX MIXTURE.

By reason of the various requests from manufacturers for information relative to what are to be considered the active and what the inert ingredients of Bordeaux mixture a laboratory investigation was carried on to determine the effect of the constituents of Bordeaux mixture on fungi. An extended investigation of all chemical literature relative to the composition of Bordeaux mixture and of the literature relative to spraying with Bordeaux mixture was also made. As a result of this work it was determined that only the copper compounds possessed fungicidal value, and that any or all of five or six complicated copper compounds might be present in a Bordeaux mixture, according to its method of preparation. It was further decided that not only was it impossible to determine just which of these copper compounds were present in a given Bordeaux mixture, but it was not necessary to do so inasmuch as it was only the copper from these compounds, which being slowly rendered soluble by weathering, possessed fungicidal qualities. As a result of this investigation Insecticide Decision No. 6 was published.

PUBLICITY.

The advantage of carrying on a campaign of education through which the trade, State officials, and the consuming public might acquire a familiar knowledge of the insecticide law, its purposes, and the methods of its enforcement has not been overlooked. Necessary information has been disseminated throughout the United States by means of form letters to State officials and dealers and by the distribution of copies of the law, regulations issued thereunder, and insecticide decisions, to members of scientific societies, official representatives of foreign countries, and to those directly and indirectly connected with the manufacture and sale of insecticides, Paris greens, lead arsenates, and fungicides. Approximately 65,000 public documents of the character above described have been distributed, while information has been further conveyed through the medium of press notices summarizing insecticide decisions and other matters of general interest. A voluminous correspondence has been conducted with persons who have been sufficiently interested in the law to make special inquiries. From the tenor of the correspondence received at this department and from the oral hearings which have been held it is evident that an overwhelming majority of the manufacturers, jobbers, and dealers of this country desire to conform to the provisions of the act and to accede to the opinions of this department respecting its construction. It is hoped, therefore, that the publication of the opinions and decisions of the department will give to manufacturers the information necessary to enable them to comply with the law and thus avoid litigation.

CLERICAL AND FISCAL OPERATIONS.

A total of 8,000 letters was written to approximately 2,200 correspondents; 6,500 letters were received and filed; 313 purchase orders were issued for current supplies for the office and laboratories; 615 vouchers were checked and passed to the disbursing officer for payment; 106 expenditure authorizations were issued to those connected with the work; 561 manufacturers' or dealers' guaranties under the insecticide act were received, examined, filed, and serial numbers assigned thereunder. In the executive office complete records were kept of the collection, receipt, analysis, and disposition of each case arising under the insecticide act. These records are complex, important, and voluminous, and involve verbatim reports of hearings and exact detailed records of all intermediate action pending final disposition of the cases. An executive officer, two stenographers, and a messenger boy carry on this work, the letters relative to the scientific subjects being prepared in the various bureaus by members of the board along their special lines.

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